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ENVIRONMENTAL ASSESSMENT

DISPOSITION OF THORIUM NITRATE

October 2003

Defense Logistics Agency
Defense National Stockpile Center
Fort Belvoir, Virginia

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SUMMARY

The Defense National Stockpile Center (DNSC) is preparing this environmental assessment (EA) to address the potential environmental impacts of the proposed disposal of the DNSC stockpile of thorium nitrate. DNSC is a field activity of the Defense Logistics Agency (DLA) and is responsible for providing safe, secure, and environmentally sound stewardship of more than 7 million lb (3.2 million kg) of thorium nitrate, also known as thorium nitrate pentahydrate [$Th(NO_3)_4 \cdot 5H_2O$].

The thorium nitrate stockpile was acquired between 1957 and 1964 as part of the U.S. Government's strategic and critical materials stockpile. The stockpile of thorium nitrate is stored in approximately 21,000 drums located at two DNSC depots: Curtis Bay, Maryland, and Hammond, Indiana. The thorium nitrate stockpile was acquired for the Atomic Energy Commission, a predecessor to the U.S. Department of Energy (DOE), and was retained because of its potential use as a nuclear fuel. That potential did not materialize. The U.S. Congress determined that the entire stockpile of thorium nitrate is excess material and has authorized its disposal. The thorium nitrate stockpile has been offered for sale in amounts of single drums or greater for many years, but there have been no customers since 1990. Accordingly, DNSC proposes to dispose of this material.

DNSC proposes to end its stewardship of the thorium nitrate stockpile in a manner that would be safe, secure, and environmentally sound, with minimal risk to the workers, the public, and the environment. DNSC's preferred action would be to transfer ownership of the thorium nitrate stockpile to the Department of Energy's (DOE's) Nevada Test Site (NTS). This EA also includes analysis of the potential environmental impacts of the proposed transfer to NTS of five drums each of thorium hydroxide and thorium oxalate stored at Curtis Bay Depot. NTS would dispose of the transferred materials.

NTS—a DOE facility located about 65 miles (105 km) northwest of Las Vegas, Nevada—is the former continental U.S. site for atmospheric and underground nuclear weapons testing. One of the current missions of NTS is to manage wastes generated on its site and at other DOE-approved facilities across the United States. Low-level radioactive waste (LLRW) generated at NTS and at DOE-approved offsite generators is disposed of in Areas 3 and 5. In Area 3, there are a large number of subsidence craters resulting from underground testing of nuclear weapons. At Area 3 Radioactive Waste Management Site, a few of these craters have been prepared for disposal of LLRW. The Area 5 Radioactive Waste Management Site contains a series of engineered trenches for disposal of LLRW. Any material accepted by NTS for disposal must meet numerous criteria, including (1) the material must be radioactive and (2) if not produced in Nevada, the material must not be classifiable under the Resource Conservation and Recovery Act (RCRA) as a hazardous waste.

Because of the presence of thorium, the thorium nitrate is a radioactive material. The present form of DNSC's thorium nitrate is an association of five water molecules for each molecule of thorium nitrate. Thorium nitrate is classified as an oxidizer in the U.S. Department of Transportation's *Hazardous Materials Table* (49 CFR §172.101). This means that DNSC's thorium nitrate would be classified under RCRA as a hazardous material, and would not be acceptable at NTS. However, a recent detailed characterization, which analyzed and distinguished

the chemical and radiological nature specifically of DNSC's stored thorium nitrate, demonstrated that it does not exhibit any of the characteristics given in 40 CFR §261.21-24 that would make it a RCRA hazardous waste. Therefore, NTS can accept this DNSC source material.

The potential for environmental impacts is assessed at both of the stockpile storage sites, along the potential transportation corridors, and at NTS. Cumulative impacts of the proposed action and no-action alternative are also evaluated. The areas of assessment include potential impacts from routine operations on land use; ecological resources, including threatened and endangered species; water resources; waste disposal; socioeconomics; human health and safety; environmental justice; cultural resources; noise; transportation; and air quality. Potential impacts to human health from accidents are also assessed.

Because injuries sustained in traffic and/or rail accidents could result in fatalities, these accidents would produce the greatest potential for adverse impacts resulting from the proposed action. The potential impacts to human health from such accidents are evaluated. The accident analysis addresses only potential impacts to individuals because all credible accidents are sufficiently small that they would not produce large or permanent impacts on a greater scale.

Accident analyses are framed in probabilistic terms; accident analysis can only estimate the likelihood that a particular event would occur. The results of the accident analysis in this EA show that less than one non-fatal injury would be expected to result from traffic and rail accidents that may occur during transport of the thorium nitrate stockpile. Similarly, less than one fatality would be expected to result from injuries sustained in traffic and/or rail accidents that may occur during transport of the thorium nitrate stockpile. Because thorium nitrate is a solid, accidental spills, if any were to occur, could be contained and cleaned up quickly. Therefore, traffic and rail accidents during transportation of the thorium nitrate stockpile would produce no significant adverse impacts on human health or the environment.

Based on the analysis of the potential impacts to the human environment from routine operations, including waste disposal, to water resources, land use and ecological resources, socioeconomics, human health and safety, and environmental justice, this EA concludes that the proposed action would produce no significant adverse impacts. Additionally, indirect (cumulative) impacts would also produce no significant adverse impacts to the human environment.

Based on the results of the analyses performed during the preparation of this EA, it can be concluded that the proposed action would produce no significant adverse impacts to the human environment. Therefore, an environmental impact statement is not needed, and a finding of no significant impact is recommended.

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ACRONYMS, ABBREVIATIONS, AND INITIALISMS

AEC	Atomic Energy Commission
ALARA	as low as reasonably achievable
°C	degrees Celsius
CFR	*Code of Federal Regulations*
cm	centimeter
DLA	Defense Logistics Agency
DNSC	Defense National Stockpile Center
DoD	Department of Defense
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EA	environmental assessment
EIS	environmental impact statement
FPEIS	final programmatic environmental impact statement
ft	feet
FY	fiscal year
gal	gallon
hr	hour
in.	inch
ISO	(accepted designation for) International Organization for Standardization
kg	kilogram
km	kilometer
L	liter
lb	pound
LLRW	low-level radioactive waste
m	meter
m^3	cubic meters
mrem	millirem
mSv	millisievert
NEPA	National Environmental Policy Act
NRC	Nuclear Regulatory Commission
NTS	Nevada Test Site
OSHA	Occupational Safety and Health Administration
sec	second
ThN	thorium nitrate
U.S.C.	*United States Code*
wt %	weight percent
yd	yard
yd^3	cubic yards

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GLOSSARY

activity—the number of nuclear transitions occurring in a given quantity of *radioactive material* per unit of time. For example one disintegration/second is a becquerel (Bq), which has replaced curie (Ci) as the standard unit of activity.

adsorb—to take up and hold by *adsorption.*

adsorption—the adhesion in an extremely thin layer of molecules (as of gases, solutes, or liquids) to the surfaces of solid bodies or liquids with which they are in contact.

bioaccumulation—the process by which organisms absorb chemicals or elements directly from their environment. Also, the increase in concentration of a pollutant from the environment to the first organism in a *food chain.*

biomagnify—the increase in concentration of a pollutant from one link in a *food chain* to another.

byproduct material —"(1) Any radioactive material (except special nuclear material) yielded in, or made radioactive by, exposure to the radiation incident to the process of producing or utilizing special nuclear material; and (2) The tailings or wastes produced by the extraction or concentration of uranium or thorium from ore processed primarily for its source material content, including discrete surface wastes resulting from uranium solution extraction processes. Underground ore bodies depleted by these solution extraction operations do not constitute 'byproduct material' within this definition." 10 CFR §20.1003.

contamination—undesired radioactive material that is deposited on the surface of or inside structures, areas, objects or people.

criteria pollutants—the atmospheric pollutants for which *National Ambient Air Quality Standards* exist: sulfur dioxide, nitrogen dioxide, ozone, carbon monoxide, lead, and particulate matter less than or equal to 10 μm in aerodynamic diameter.

cumulative impacts—impacts that result when the effects of an action are added to or interact with other effects in a particular place and within a particular time. It is the combination of these effects, and any resulting environmental degradation, that are the focus of cumulative impact analysis. The concept of cumulative impacts takes into account all disturbances because cumulative impacts result in the compounding of the effects of all actions over time. Thus, the cumulative impacts of an action can be viewed as the total effects on a resource, ecosystem, or human community of that action and all other activities affecting that resource no matter what entity (federal, non-federal, or private) is taking the actions.

diluent—a diluting agent.

evapotranspiration—discharge of water from the earth's surface to the atmosphere by evaporation from bodies of water, or other surfaces, and by transpiration from plants (i.e., direct transfer of water from the leaves of living plants to the atmosphere).

flux—a general term used to describe the rate, velocity, and/or direction of flow of something in motion.

food chain—an arrangement of the organisms of an ecological community according to the order of predation in which each uses the next usually lower member as a food source.

gray—the SI (International System of Units) unit of absorbed dose. One gray (Gy) is equal to an absorbed dose of 1 joule/kg (1 Gy = 100 rads). (The joule is the SI unit of energy, abbreviated as J.) 10 CFR §20.1004.

industrial-type accidents—a broad term for any undesired event that results in injury to workers or damage to property or the environment during or as a result of work activities.

ion—(1) an atom or group of atoms that carries a positive or negative electric charge as a result of having lost or gained one or more electrons (2) a charged subatomic particle (e.g., a free electron).

isotope—any two or more forms of an element having identical or very closely related chemical properties and the same atomic number but different atomic weights or mass numbers.

low-level radioactive waste—a general term for a wide range of radioactive wastes. Industries, hospitals, and medical, educational, or research institutions; private or government laboratories; and nuclear fuel cycle facilities (e.g., nuclear power reactors and fuel fabrication plants) that use radioactive materials generate low-level radioactive wastes as part of their operations. These wastes are generated in many physical and chemical forms and levels of contamination (see 10 CFR §61.2). Low-level wastes containing *source*, *special nuclear*, or *byproduct material* are acceptable for disposal in a land disposal facility.

mill tailings—naturally radioactive residue from the processing of uranium ore into yellowcake in a mill. Although the milling process recovers about 93 percent of the uranium, the residues, or tailings, contain several naturally-occurring radioactive elements, including uranium, thorium, radium, polonium, and radon.

National Ambient Air Quality Standards—standards established by the Environmental Protection Agency that apply for outdoor air throughout the United States.

playa—the flat-floored center of an undrained desert basin.

platooning—to alternate workers for the same task. This practice can be used as part of the administrative controls to minimize the amount of radiation exposure to workers.

rad—the special unit for radiation absorbed dose, which is the amount of energy from any type of ionizing radiation (e.g., alpha, beta, gamma, neutrons, etc.) deposited in any medium (e.g., water, tissue, air). A dose of one rad means the absorption of 100 ergs (a small but measurable amount of energy) per gram of absorbing tissue (100 rad = 1 gray). 10 CFR §20.1004.

radiation—(ionizing radiation) means alpha particles, beta particles, gamma rays, x-rays, neutrons, high-speed electrons, high-speed protons, and other particles capable of producing ions. Radiation, as used in this part, does not include non-ionizing radiation, such as radio- or microwaves, or visible, infrared, or ultraviolet light. 10 CFR §20.1003 *radiation dose*—in general, dose is a measure of the biological damage to living tissue from radiation exposure. The absorbed dose is given in *rem* or *sieverts*. In non-biological material, dose represents the energy absorbed from the radiation in a gram of the material. It is measured in *rads* (or the metric unit of *grays*).

radiation field—the sum of all types of radiation at a location.

radioactive material—any material that spontaneously emits *radiation*, generally alpha or beta particles, often accompanied by gamma rays, from the nucleus of its atoms.

RCRA reactivity, corrosivity, ignitability, or toxicity characteristics—The Environmental Protection Agency established characteristics for determining if a solid waste is a hazardous waste and, therefore, subject to regulation. The thorium nitrate in the stockpile does not meet the criteria for being classified as a hazardous waste. This determination affects both the transport of the thorium nitrate and its acceptability for disposal. For a detailed discussion of the assessment of RCRA characteristics of the thorium nitrate, see *Characterization of the Defense Logistics Agency's Thorium Nitrate Stockpile* by C.H. Mattus, W.H. Hermes, and J.W. Terry (ORNL/TM-2003/54, Oak Ridge National Laboratory, Oak Ridge, Tenn.).

rem—the acronym for Roentgen Equivalent Man, a standard unit that measures the effects of ionizing radiation on humans. The dose equivalent in rems is equal to the absorbed dose in rads multiplied by the quality factor of the type of radiation (see 10 CFR §20.1004 for a list of the quality factors by type of radiation). 10 CFR §20.1004.

sievert—The new SI unit for dose equivalent equal to 1 Joule/kilogram. 1 sievert = 100 rem. (see also *rem*.) The dose equivalent in sieverts is equal to the absorbed dose in grays multiplied by the quality factor (see 10 CFR §20.1004). 10 CFR §20.1004.

source material—". . .means (1) uranium or thorium or any combination of uranium and thorium in any physical or chemical form; or (2) ores that contain, by weight, one-twentieth of 1 percent (0.05 percent), or more, of uranium, thorium, or any combination of uranium and thorium. Source material does not include special nuclear material. 10 CFR §20.1003.

special nuclear material—". . .means (1) plutonium, uranium-233, uranium enriched in the isotope 233 or in the isotope 235, and any other material that the Commission, pursuant to the provisions of section 51 of the Act, determines to be special nuclear material, but does not include source material; or (2) any material artificially enriched by any of the foregoing but does not include source material. 10 CFR §20.1003.

strategic materials—For DNSC, "The term 'strategic and critical materials' means materials that (a) would be needed to supply the military, industrial, and essential civilian needs of the United States during a national emergency and (b) are not found or produced in the United States in sufficient quantities to meet such need." 50 U.S.C., Chap. 5, Subchap. 3, §98h-3.

thorium—a naturally occurring, radioactive metal (see *radioactive material*). Small amounts of thorium are present in all rocks, soil, above-ground and underground water, plants, and animals. More than 99% of natural thorium exists in the form (*isotope*) thorium-232.

thorium hydroxide—one of the end products of the chemical conversion experiments with thorium nitrate; the chemical formula for thorium hydroxide is $Th(OH)_4$.

thorium nitrate—anhydrous thorium nitrate (i.e., containing no water molecules) has the chemical formula $Th(NO_3)_4$ and a molecular weight of 480.06. The thorium nitrate in the stockpile has water molecules associated with it and has the chemical formula $Th(NO_3)_4 \cdot 5H_2O$, which is called thorium nitrate pentahydrate. Nearly all the *thorium* in nature and in the stockpile occurs in the form of thorium-232.

thorium oxalate—one of the end products of the chemical conversion experiments with thorium nitrate; the chemical formula for thorium oxalate is $Th(C_2O_4)_2$.

threatened and endangered species—An endangered species is any animal or plant that is facing extinction throughout all or a significant part of its range as a result of anthropogenic (human-caused) or natural changes in the environment. Requirements for declaring a species endangered are contained in the Endangered Species Act. A threatened species is any plant or animal that is likely to become endangered in the foreseeable future.

1. NEED FOR THE PROPOSED ACTION

The Defense National Stockpile Center (DNSC) proposes to end its stewardship of the thorium nitrate stockpile, currently stored at two U.S. locations, in a safe and environmentally sound manner, with minimum radiation exposure and risk to the workers, the public, and the environment. DNSC needs to perform the proposed action because the thorium nitrate stockpile is excess to the needs of the U.S. Department of Defense. No other agency of the federal government has a need for this thorium nitrate, and there is no market for its sale.

1.1 INTRODUCTION AND BACKGROUND

This environmental assessment (EA) has been prepared by the DNSC to address the potential environmental impacts of the proposed disposal of the DNSC stockpile of thorium nitrate. Through the Strategic and Critical Materials Stock Piling Act of 1939, the National Defense Stockpile was established by Congress to minimize U.S. dependence on foreign sources of essential materials during times of national emergency. Between 1949 and 1988, the General Services Administration managed the program. In 1988, the responsibility for the National Defense Stockpile was transferred to the Secretary of Defense, who assigned the program to the Defense Logistics Agency (DLA). DNSC is a field activity of DLA and is responsible for providing safe, secure, and environmentally sound stewardship of the thorium nitrate stockpile and other critical materials.

The DNSC thorium nitrate stockpile was acquired between 1957 and 1964 for the Atomic Energy Commission, a predecessor to the U.S. Department of Energy (DOE), and has been retained because of its potential use as a source material for nuclear fuel. However, the use of thorium as a nuclear fuel has been impeded by the surplus inventory of low-cost, highly enriched uranium from the post Cold War weapons disarmament program. Because of the readily available, inexpensive uranium, a domestic commercial thorium-based fuel cycle application has not been developed. The thorium nitrate stockpile has been made available for purchase in amounts of single barrels or greater for many years, but there have been no customers since 1990.

The U.S. Congress has enacted legislation (Public Laws 98-525, 99-661, 100-456, and 107-107) that cumulatively made the entire stockpile of thorium nitrate excess material and provided the authority to dispose of it. Congress has determined that over 95% of the National Defense Stockpile inventory, including the entire thorium nitrate stockpile, is excess to Department of Defense needs and has directed its disposal. As DNSC sells or disposes of materials in its inventory it is vacating those depots where materials have previously been stored. The Curtis Bay, Maryland, Depot will no longer have a permanent staff as of the end of September 2003. It is anticipated that the Hammond, Indiana, Depot will close by the end of September 2007. At that time, it is expected that DNSC will no longer exist as an independent entity and will be absorbed into another Defense Logistics Agency activity. It is therefore imperative that DNSC provide for the safe stewardship and disposal of materials that cannot be sold.

1.2 STORAGE DEPOTS

The DNSC currently manages the storage of over 7 million lb (3.2 million kg) of thorium nitrate, also known as thorium nitrate pentahydrate $[Th(NO_3)_4 \cdot 5H_2O]$. The stockpile of thorium nitrate is stored in over 21,000 containers at two DNSC depots: Curtis Bay, Maryland (Fig. 1), and Hammond, Indiana (Fig. 2). In addition to the thorium nitrate, Curtis Bay Depot stores 5 drums each of thorium hydroxide and thorium oxalate, which were converted from thorium nitrate (Hermes et al. 1998).

Curtis Bay Depot is located in Anne Arundel County, Maryland, less than 0.5 mile (0.8 km) from Baltimore County and the City of Baltimore. The street address for Curtis Bay Depot is 710 Ordnance Road, Baltimore, Maryland. Curtis Bay Depot borders Back, Curtis, and Furnace creeks. The Chesapeake Bay is about 8 miles (13 km) to the east (Fig. 1). Hammond Depot is located in Lake County, Indiana, less than 0.1 mile (0.2 km) from Cook County, Illinois, and the City of Chicago. The street address for Hammond Depot is 3200 Sheffield Avenue, Hammond, Indiana. Hammond Depot borders Wolf Lake, and Lake Michigan is about 2.5 miles (4.0 km) to the north (Fig. 2).

About 75% (by weight) of the thorium nitrate is stored at the Curtis Bay Depot in three warehouses. The thorium nitrate stockpile at Curtis Bay Depot is comprised of nearly 5.2 million lb (2.4 million kg) in over 19,000 drums. In addition to the thorium nitrate, there are 10 drums of converted thorium nitrate at Curtis Bay Depot. In terms of mass content, 64.1% (by weight) of the Curtis Bay stockpile is of domestic origin, as compared with 26.6% (by weight) that was produced in France and 9.3% (by weight) that was produced in India. The remainder of the thorium nitrate, about 1.8 million lb (0.8 million kg) in approximately 2,300 drums, is stored at Hammond Depot in one warehouse. The entire thorium nitrate stockpile at Hammond Depot is of domestic origin. It is DNSC's intention to vacate the Curtis Bay and Hammond Depots. Removal of the thorium nitrate inventory is one step DNSC must accomplish before the depots can be closed.

The thorium nitrate is stored in six types of containers: MD-1, MD-2, MD-3, MD-4, MD-5, and IN-1; the converted thorium nitrate is stored in containers designated MD-C. The container designations are specific to the depot storing the material. Curtis Bay Depot stores only MD type containers, and Hammond Depot stores only IN type containers. The quantities of each container type, the container characteristics, the quantity of thorium nitrate per container, and the country where the thorium nitrate was produced are given below:

- MD-1: 15,701 30-gal (114-L) steel drums each containing 200 lb (91 kg) of thorium nitrate produced in the United States.
- MD-2: 1,901 55-gal (208-L) steel drums each containing 728 lb (330 kg) of thorium nitrate produced in France and 760 55-gal (208-L) steel drums each containing 634 lb (288 kg) of thorium nitrate produced in India.
- MD-3: 184 55-gal (208-L) steel drums each containing 200 lb (91 kg) of thorium nitrate produced in the United States.
- MD-4: 753 40-gal (151-L) polyethylene drums each containing 200 lb (91 kg) of thorium nitrate produced in the United States.
- MD-5: 66 85-gal (322-L) steel drums each containing 728 lb (330 kg) of thorium nitrate produced in France or 634 lb (288 kg) of thorium nitrate produced in India.

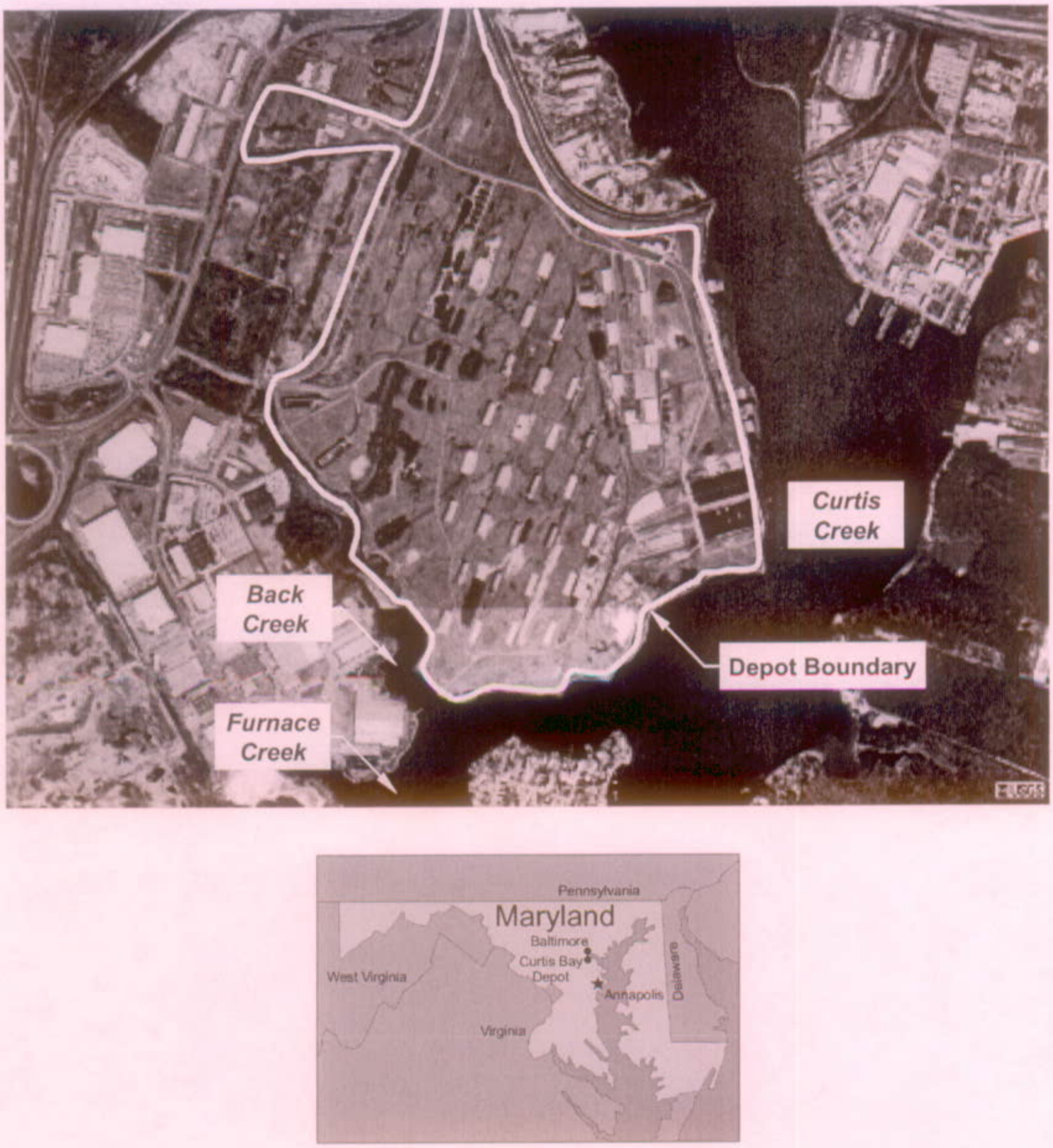

Fig. 1. Aerial photograph of Curtis Bay Depot and its environs.

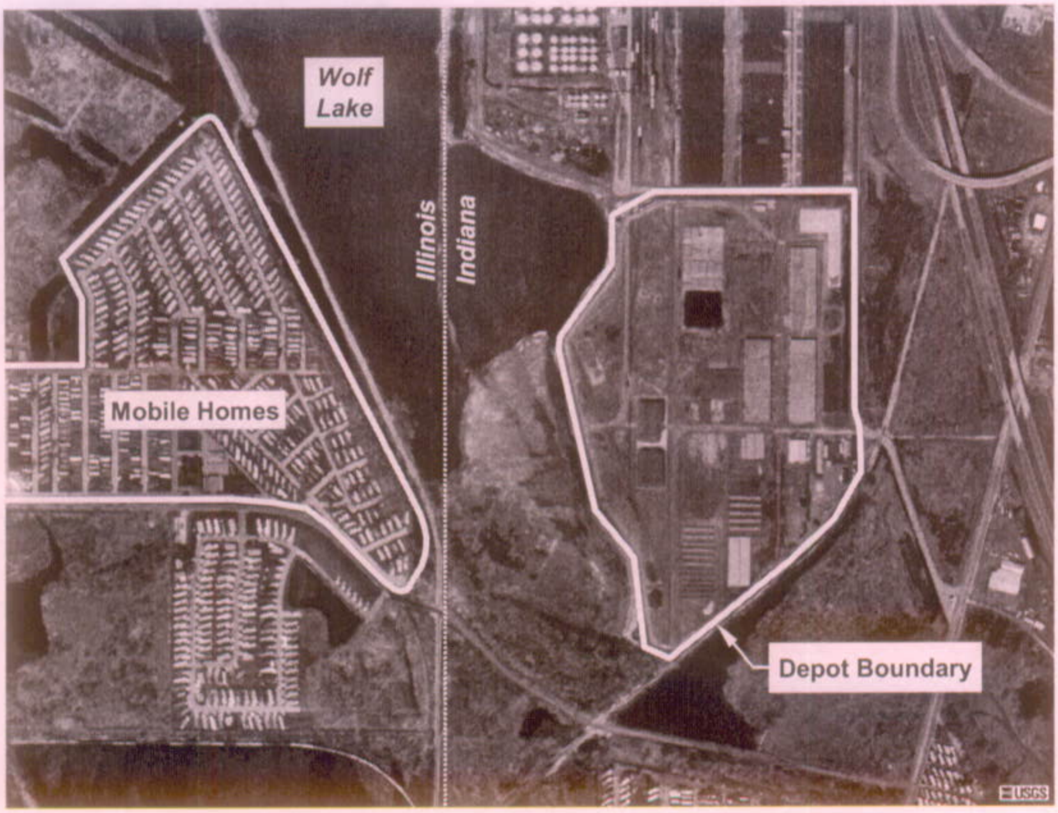

Fig. 2. Aerial photograph of Hammond Depot and its environs.

- MD-C: 10 30-gal (114-L) steel drums each containing 100 lb (45 kg) of converted thorium nitrate.
- IN-1: 2,308 85-gal (322-L) steel drums each containing 825 lb (374 kg) of thorium nitrate produced in the United States.

More information concerning the origin of the thorium nitrate and current storage sites is presented in Appendix A and in an engineering study conducted by Oak Ridge National Laboratory (Hermes et al. 2000).

1.3 NEVADA TEST SITE

DNSC proposes to transfer ownership of the thorium nitrate stockpile to DOE's Nevada Test Site (NTS). DOE would dispose of the thorium nitrate at NTS, which is located about 65 miles (105 km) northwest of Las Vegas, Nevada (see Fig. 3). NTS is the former continental U.S. site for atmospheric and underground nuclear weapons testing. One of the current missions of NTS is to manage wastes generated on its site and at other DOE-approved facilities across the United States. Low-level radioactive waste (LLRW) generated at NTS and at DOE-approved offsite generators is disposed of in Areas 3 and 5. In the Area 3 Radioactive Waste Management Site, a few subsidence craters resulting from underground testing of nuclear weapons have been prepared for disposal of LLRW (see Fig. 3); the Area 5 Radioactive Waste Management Site contains a series of engineered trenches for disposal of LLRW.

Disposal activities have occurred at NTS for more than 10 years. For the immediate future (at least 10 years), disposing of LLRW will continue to be a mission for NTS. The available capacity at NTS for LLRW disposal exceeds 2 million yd^3 (1.5 million m^3). The NTS Environmental Impact Statement (EIS) estimates that 1.35 million yd^3 (1.03 million m^3) of LLRW would be disposed of at NTS over a 10-year period (DOE 1996).

NTS is selective about the materials it accepts for disposal. There are numerous criteria which all materials must meet. Two of these criteria are particularly relevant to the thorium nitrate stockpile: (1) the material must be radioactive and (2) if not produced in Nevada, the material must not be classifiable as hazardous under the Resource Conservation and Recovery Act (RCRA).

1.4 CHARACTERISTICS OF THORIUM NITRATE

The characteristics of DNSC's thorium nitrate are summarized in Table 1. Thorium is a naturally occurring radioactive element. The presence of thorium in thorium nitrate causes it to be a radioactive material. Thorium nitrate is soluble in water, and, in its solid form, each molecule may associate with several water molecules. The present form of DNSC's thorium nitrate is an association of five water molecules for each molecule of thorium nitrate.

Thorium nitrate is considered an oxidizer as specified in the U.S. Department of Transportation's (DOT's) *Hazardous Materials Table* (49 CFR §172.101). Because the Environmental Protection Agency's criterion for the ignitability characteristic (40 CFR §261.22) defers to the DOT definition of an oxidizer, thorium nitrate, in general, is also considered hazardous under RCRA. DOT allows testing, which it specifies, to determine if particular materials may be reclassified as non-hazardous for shipping.

Table 1. Characteristics of the Defense National Stockpile Center's thorium nitrate

Chemical formula	$Th(NO_3)_4 \cdot 5H_2O$
Physical and chemical properties	white crystalline mass; soluble in water and alcohol; decomposes to an oxide at 500°C
Hazards	radioactive
Uses	nuclear fuel; impregnating liquid for incandescent mantles; thoriated tungsten welding electrodes; catalysts; medicine; reagent for identification of fluorine; high-temperature ceramics

DOT concurred with DNSC's request for the performance of testing specified by DOT to determine if the thorium nitrate stockpile must be shipped as an oxidizer (letter from Hattie L. Mitchell, DOT, to F. Kevin Reilly, DNSC, March 13, 2001). DNSC performed a detailed analytical characterization (Mattus et al. 2003) that was designed to better analyze and distinguish the specific chemical and radiological nature of its stored thorium nitrate. The DOT-specified oxidizer test (UN 1999, Section 34.4) was performed, and the thorium nitrate stockpile was determined not to be an oxidizer. The characterization showed that the DNSC thorium nitrate stockpile does not exhibit any of the characteristics—ignitability, reactivity, corrosivity, or toxicity—that would make it hazardous under the criteria defined by RCRA (40 CFR §261.21-24). Hence, NTS can accept this DNSC source material.

An increase in onsite disposal at some of the larger DOE sites caused the Supplement Analysis for the NTS EIS (DOE 2002) to lower the estimated 10-year disposal volume to approximately 677,000 yd^3 (518,000 m^3). The 2002 Supplement Analysis addresses those waste streams that may be sent to NTS for management during the 2002–2011 period; the DNSC's thorium nitrate is specifically included as an additional waste stream beyond those considered in the 1996 NTS EIS (see DOE 2002, Section 3.1.2.2).

The total quantity of LLRW shipped to NTS in fiscal year (FY) 2002 (October 2001–September 2002) was 85,730 yd^3 (65,550 m^3) (DOE 2003). On Mondays through Thursdays during FY 2002, an average of 32 trucks per week brought LLRW to the disposal sites at NTS. During the fourth quarter of FY 2002, an average of 50 trucks per week brought LLRW to NTS.

1.5 SCOPE OF THE ENVIRONMENTAL ANALYSIS

This EA assesses the potential environmental impacts of the alternatives for disposal of thorium nitrate. The study has been performed and documented in accordance with the National Environmental Policy Act (NEPA), the Council on Environmental Quality Regulations implementing NEPA, and with DLA Regulation 1000.22, "Environmental Considerations in DLA Actions in the United States." As required under these regulations, the no-action alternative is also considered.

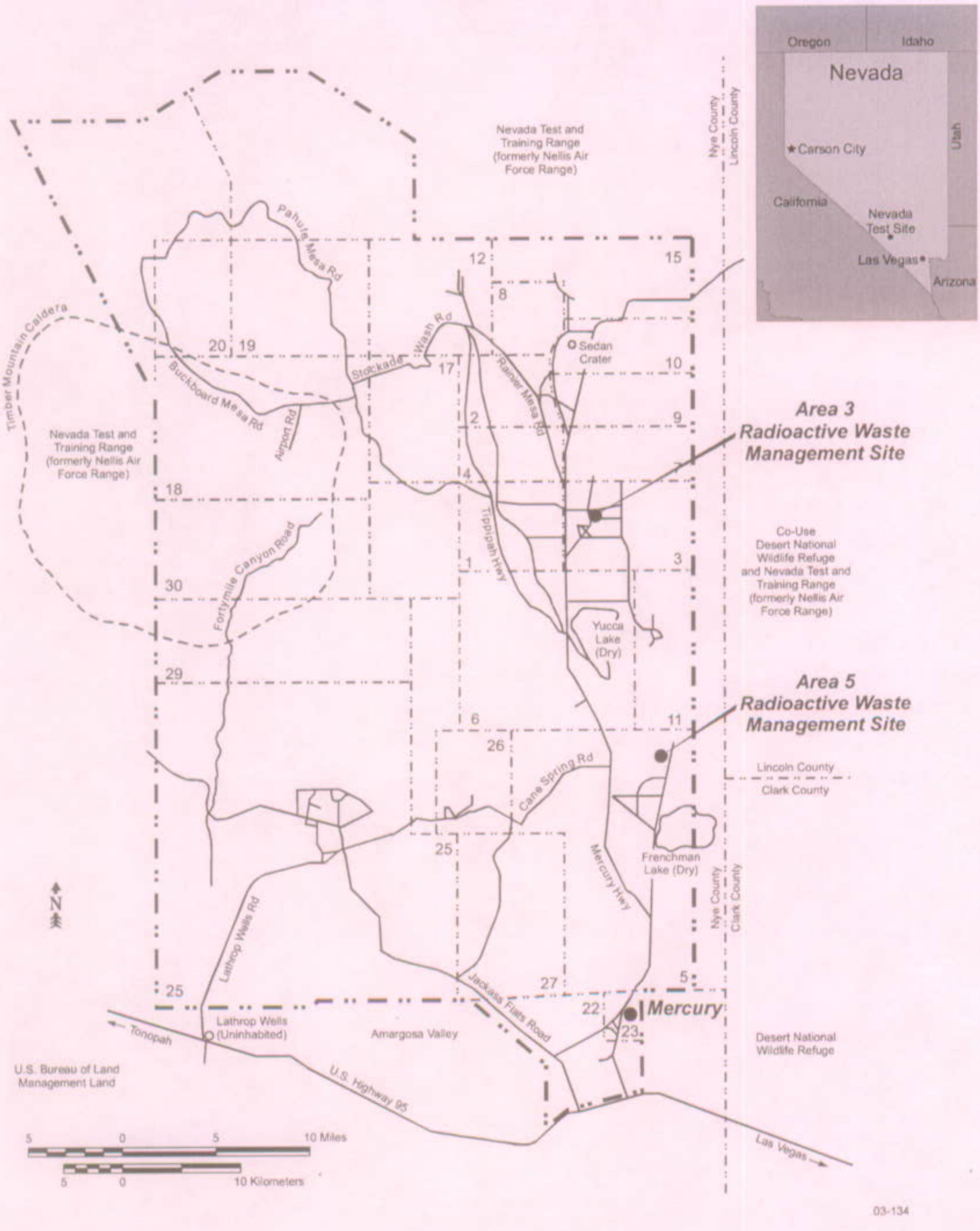

Fig. 3. Nevada Test Site.

The potential for environmental impacts is assessed at each of the storage sites, along the potential transportation corridors, and at the proposed disposal site. Cumulative impacts of the proposed action and no-action alternative are also evaluated. The areas of assessment include potential impacts from routine operations to land use; ecological resources, including threatened and endangered species; water resources; waste disposal; socioeconomics; human health and safety; environmental justice; archaeological and historic resources; noise; transportation; and air quality. Potential impacts to human health from accidents are also assessed.

1.6 REFERENCES

DOE (U.S. Department of Energy) 1996. *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada*, DOE/EIS 0243, DOE, Nevada Operations Office, Las Vegas, Nev.

DOE (U.S. Department of Energy) 2002. *Supplement Analysis for the FEIS for the NTS and Off-Site Nevada Locations*, DOE/EIS-0243-SA-01, DOE/National Nuclear Security Administration, Nevada Operations Office, Las Vegas, Nev.

DOE (U.S. Department of Energy) 2003. *Annual Report – FY 2002: Radioactive Waste Shipments to and from the Nevada Test Site*, DOE/National Nuclear Security Administration, Nevada Operations Office, Las Vegas, Nev.

Hermes, W.H. et al. 1998. *Thorium Nitrate Pilot-Scale Demonstration and Stockpile Processing Option Results Report*, ORNL/M-6625, Oak Ridge National Laboratory, Oak Ridge, Tenn., Dec.

Hermes, W.H. et al. 2000. *Thorium Nitrate Material Inventory Definition Report*, ORNL/TM-2001/14, Oak Ridge National Laboratory, Oak Ridge, Tenn.

Mattus, C.H. et al. 2003. *Characterization of the Defense National Stockpile Center's Thorium Nitrate Stockpile*, ORNL/TM-2003/54, Oak Ridge National Laboratory, Oak Ridge, Tenn.

UN (United Nations) 1999. *Recommendations on the Transport of Dangerous Goods: Manual of Tests and Criteria, Third revised edition*, ST/SG/AC.10/11/Rev. 3, New York.

2. ALTERNATIVES CONSIDERED

An engineering study of the disposition of the thorium nitrate stockpile (Hermes et al. 2001) identified four alternatives: (1) dispose of as thorium nitrate (the preferred alternative), (2) store long term as thorium nitrate, (3) convert the thorium nitrate to a form thought to be more suitable for disposal and dispose of it, and (4) convert the thorium nitrate to a form more suitable for long-term storage and store it for an extended period.

Because this material is no longer needed for national defense purposes, continued storage is not compatible with DNSC's long-range operational plan to reduce its inventory of commodities and storage locations. Therefore, both storage alternatives [(2) and (4)] were dismissed from further consideration because these alternatives do not satisfy DNSC's need (see Section 1) for final disposition of the thorium nitrate.

Alternative (3), converting the thorium nitrate to a form thought to be more suitable for disposal, was dismissed from further consideration because it proved to be unnecessary. The form of the thorium nitrate stockpile has been determined to be suitable for disposal; as detailed in Section 1.3, it is not hazardous under RCRA (Mattus et al. 2003).

Three sub-options were identified for the remaining alternative, disposal as thorium nitrate,

Alternative (1):

Option A. Disposal in drums at a uranium mill tailings impoundment
Option B. Disposal at a commercial disposal facility as LLRW
Option C. Disposal in drums at a federal facility

Options (A) and (B) were dismissed from further consideration. Option (A) was dismissed because the thorium nitrate does not meet the requirements for materials that may be disposed of in such an impoundment. Only byproduct materials or materials physically similar to byproduct materials may be in the mill tailings pile or impoundment (see NRC 2000 Attachment 1). The thorium nitrate is described in DNSC's radioactive materials license (Appendix B) as source material. Because the thorium nitrate is classified as source material rather than as byproduct material, it may not be stored or disposed of in a mill tailings impoundment.

Option (B), disposal at a commercial disposal facility, was dismissed because existing commercial facilities are not authorized to dispose of source material. For example, the radioactive materials license for Envirocare of Utah (UDEQ 2003 Section 9.A.) states, "Licensee may receive, store, and dispose by land burial, radioactive material as naturally occurring and accelerator produced material (NARM) and low-level radioactive waste." DNSC's thorium nitrate is source material (Appendix B), not NARM or low-level radioactive waste.

In addition, operational and regulatory constraints may introduce additional safety hazards and radiation exposures to the workers.

- Radioactive materials presented for bulk disposal may be subjected to a series of handling steps between receipt and disposal. For example, the waste acceptance criteria for wastes that would be disposed of in the bulk disposal cell at Envirocare of Utah (EU 2003a) show that wastes transported in intermodal (cargo) containers may be unloaded into bins; loaded into trucks; and transported to the disposal cell. Each handling step before disposal introduces additional radiation exposure and, because many of the drums are pressurized (see Section 2.1), additional safety hazards to the workers.
- Waste acceptance criteria may require that containers be opened to verify the measurements reported by waste generators [e.g., see the bulk and containerized waste acceptance criteria for Envirocare of Utah (EU 2003a and EU 2003b)]. Opening the drums and inspecting the contents before disposal would introduce additional radiation exposure and safety hazards to the workers.
- Although disposal as containerized wastes may be less likely than disposal as bulk wastes, constraints would be imposed on the void spaces in waste containers presented for containerized waste disposal [e.g., see the radioactive materials license for Envirocare of Utah (UDEQ 2003)], and may be applicable to the bulk disposal cell. Filling the voids would necessitate opening drums with the attendant radiation exposures and safety hazards. Drums with lids or bottoms that bulge beyond stated limits [e.g., see the containerized waste acceptance criteria for Envirocare of Utah (EU 2003b)] may require additional handling and repackaging with the attendant radiation exposures and safety hazards.

For the reasons given above, this option would not satisfy DNSC's stated purpose "to end the DNSC's stewardship of the thorium nitrate inventory in a safe and environmentally sound manner, with minimum radiation exposure and risk to the workers, the public, and the environment." Increasing safety hazards and radiation exposure to the workers does not minimize their risk.

Alternative (1), Option (C), disposal in drums at a federal facility is the only viable method for accomplishing the proposed action. Hence, from this point forward in the EA the proposed action will be described as disposal of the thorium nitrate stockpile at the NTS. Because there is only one viable alternative, the preferred alternative and the proposed action are the same.

2.1 PROPOSED ACTION—DISPOSE OF THE THORIUM NITRATE STOCKPILE AT THE NEVADA TEST SITE

In the proposed action, the thorium nitrate inventories at Curtis Bay and Hammond Depots would be removed as-is from the storage warehouses and placed in standard 20 × 8 × 8.5 ft (6.1 × 2.4 × 2.6 m) cargo containers located adjacent to the warehouses. These cargo containers are also called ISO containers (ISO is an internationally accepted designation for the International Organization for Standardization.). The cargo containers would be transported by trucks or by a combination of trucks and railway cars to NTS. At NTS, the filled cargo containers would be disposed of by burial either in an engineered trench—Area 5 Waste Management Site—or in a prepared subsidence crater—Area 3 Waste Management Site (see Fig. 3).

The total volume of the thorium nitrate stockpile is approximately 5,000 yd^3 (3,800 m^3). The external volume of a single cargo container is approximately 50 yd^3 (38 m^3). The total volume for disposal, including secondary wastes (contaminated personal protective equipment, tools, and drums), would be approximately 13,000 yd^3 (9,900 m^3). This amount of waste would make up only 2% of the quantity projected in the NTS 10-year forecast.

Work at the depots would be performed one warehouse at a time, subject to a stringent health and safety plan. Thorium nitrate is packaged in six types of drums, five (MD-1 through MD-5) at Curtis Bay and one (IN-1) at Hammond. Only the MD-1 drums are known to be pressurized; they will require special handling to mitigate the potential pressurization safety hazard to the workers. Because the MD-3 drums have similar internal packaging, they will be handled in the same way as the MD-1 drums. Drums (on pallets) containing thorium nitrate would be removed from the warehouse by a forklift, inspected, cataloged, and placed in a cargo container by a different forklift. There are about 15,000 drums of domestically produced thorium nitrate at Curtis Bay Depot, and many of them have been shown to have internal pressure (Hylton et al. 2003). To ensure worker safety, specialized equipment would be used to protect the workers when handling drums which have lids that may be propelled into the air by internal pressure. Operating procedures will be developed to reduce the risk of spreading contamination.

All workers would be trained in the potential hazards associated with the proposed action. Additionally, each worker would be issued and required to wear personal protective equipment appropriate to the hazards that may be encountered during the proposed action. Procedures will be developed to mitigate potential hazards to workers associated with the proposed action to include the following:

1. a forklift fire inside one of the ThN storage buildings
2. a dropped elevated ThN drum inside a storage building or ISO container, resulting in personnel injury without a spill of the contents
3. a dropped ThN drum, resulting in a spill of the contents, without personnel injury
4. penetration of a ThN drum with a forklift
5. a pressurized drum lid release during drum handling
6. a forklift driving off the edge of a loading dock, with or without a ThN load
7. an accident (e.g., fire) involving fuel storage and/or battery charger station for forklifts
8. a contamination incident with and without accompanying personnel injury
9. heat stress and cold stress (associated with the lack of heating, ventilation, and air conditioning in the warehouses and the use of personal protective equipment)
10. radiation exposure (individual and collective)
11. safety incidents related to personnel entry into the ISO containers

Required training for workers would minimize the potential risks to workers. That training will include the following general categories:

- Occupational Safety and Health Administration (OSHA) safety training
- radiation safety (e.g., equivalent to DOE radiological worker training)
- OSHA certification of all forklift operators
- DOT training
- waste management training
- respirator training as dictated by hazardous waste operations requirements, including medical approval for the wearing of a respirator
- material balance accountability training as applicable to source material

DNSC expects to complete the proposed action within a total of 18 months and before the end of calendar year 2005. All work would be conducted in compliance with applicable federal, state, and local regulations and requirements (see Appendix C).

2.2 NO-ACTION ALTERNATIVE—CONTINUED STORAGE OF THE THORIUM NITRATE STOCKPILE AT CURRENT LOCATIONS

Under the no-action alternative, the thorium nitrate inventories at Curtis Bay and Hammond Depots would remain there. No changes, other than repairs needed to assure safe storage, would be made to the present warehouses. The DNSC would not be able to divest itself of the thorium nitrate stockpiles at the Curtis Bay and Hammond Depots. The depots could not be closed as required by the long-term plans of the DLA, causing an adverse programmatic impact for DNSC and DLA and preventing the depots from being released for further use or development.

If thorium nitrate were to remain at Curtis Bay and Hammond Depots, it would remain in proximity to ecologically sensitive and important waterways and wetlands which lead to the Chesapeake Bay or Wolf Lake, and to major population centers: Baltimore, Maryland, and Chicago, Illinois. The potential impacts to the affected environment are presented in Section 3. In particular, potential impacts to waterways and wetlands are presented in Sections 3.2 and 3.3.

2.3 REFERENCES

EU (Envirocare of Utah) 2003a. *Envirocare of Utah Bulk Waste Disposal and Treatment Facilities Waste Acceptance Criteria, Revision 4*, Salt Lake City, Utah.

EU 2003b. *Envirocare of Utah Containerized Waste Facility Waste Acceptance Criteria, Revision 3*, Salt Lake City, Utah.

Hermes, W.H. et al. 2001. *Executive Summary Report for the Thorium Nitrate Stockpile Stewardship and Disposition Project*, ORNL/TM-2000/63, Oak Ridge National Laboratory, Oak Ridge, Tenn.

Hylton, T.D. et al. 2003. *Thorium Nitrate Stockpile Drum Characterization Report,* ORNL/TM-2003/53, Oak Ridge National Laboratory, Oak Ridge, Tenn.

Mattus, C.H. et al. 2003. *Characterization of the Defense National Stockpile Center's Thorium Nitrate Stockpile*, ORNL/TM-2003/54, Oak Ridge National Laboratory, Oak Ridge, Tenn.

NRC (Nuclear Regulatory Commission) 2000. "Recent Changes to the Uranium Recovery Policy," RIS-2000-23, Rockville, Md.

UDEQ (Utah Department of Environmental Quality) 2003. Radioactive Material License for Envirocare of Utah, Inc., License Number UT 2300249, Amendment 17, UDEQ Division of Radiation Control, Salt Lake City, Utah.

3. ENVIRONMENTAL CONSEQUENCES

3.1 LAND USE

3.1.1 Existing Environment

Both Curtis Bay Depot and Hammond Depot are previously disturbed industrial sites. As seen in the aerial photographs in Figs. 1 and 2, development exists on all sides of the depots that do not border bodies of water.

At NTS, approved LLRW is disposed of in Areas 3 and 5. The available capacity for LLRW disposal exceeds 2 million yd^3 (1.5 million m^3) (DOE 2000a,b). The Supplement Analysis for the NTS EIS (DOE 2002a) estimates that more than 677,000 yd^3 (518,000 m^3) of LLRW would be disposed of at NTS during a 10-year period beginning in FY 2002. The thorium nitrate stockpile is specifically included in the 10-year estimate (see DOE 2002a, Section 3). Excess disposal capacity exists at NTS and would continue to exist through the referenced 10-year period.

During FY 2002, about 85,730 yd^3 (65,550 m^3) of LLRW were disposed of at NTS (DOE 2003). On Mondays through Thursdays during FY 2002, an average of 32 trucks per week brought LLRW to the disposal sites at NTS. During the fourth quarter of FY 2002, there was an average of 50 trucks per week.

3.1.2 Potential Impacts of the Proposed Action

There would be no significant adverse impacts to future land use because temporary structures would be used on the previously disturbed depot sites for containment and cargo container loading processes. There would be no disturbance of additional lands.

As noted above, there is excess LLRW disposal capacity at NTS, and the DNSC thorium nitrate is included in the most recent 10-year projection (DOE 2002a). The available capacity exceeds the 10-year projection by over 1.3 million yd^3 (990,000 m^3). Hence, the proposed action would be expected to have no significant adverse impacts to land use at NTS.

3.1.3 Potential Impacts of the No-action Alternative

Long-term storage of thorium nitrate at the depots would produce an adverse programmatic land use impact for DNSC and DLA, and the depots could not be released for further use or development.

3.2 ECOLOGICAL RESOURCES

3.2.1 Existing Environment

Curtis Bay Depot borders three creeks: Back Creek to the south, Curtis Creek to the east, and Furnace Creek to the south-southwest. There are two wetland areas on the site (USFS 1998a). The smaller wetland is located on the east side of the site; the other wetland is located on the southern portion of the site.

The area of the Hammond Depot was a wetland in the mid-1940s which has since been filled with a substantial amount of blast-furnace slag to give the site a stable and level foundation (USFS 1998b). Wolf Lake borders the site on the west, and industrial properties border the remainder. An unidentified bamboo species is dense along the southeast perimeter of the site; the rest of the area has been disturbed for industrial purposes. No wetlands or other habitats suitable to support typical wildlife species are present at or adjacent to the depot (USFS 1998b).

3.2.2 Potential Impacts of the Proposed Action

The three warehouses containing thorium nitrate at Curtis Bay Depot are located no closer than 0.1 mile to any wetland area or body of water (Fig. 1). Loading of the thorium nitrate containers into cargo containers for transport would occur near the warehouses and adjacent to roads. Loading materials stored at the depot onto trucks is a common activity occurring in the surrounding area. Species in the vicinity are habituated to such routine activities.

Because no direct impacts to any areas on or surrounding the Curtis Bay Depot are expected from the action of loading and moving thorium nitrate, no impacts to rare, threatened, or endangered species are anticipated. No out of the ordinary activities would be associated with the thorium nitrate operations. Although bald eagles, which are federally listed as threatened, occur within 2 miles (~ 3 km) of the Curtis Bay Depot and have on occasion been observed in trees located on the site (USFS 1998a), no significant adverse impacts are anticipated because habitat and prey should be unaffected by thorium nitrate movement operations.

Thorium nitrate at the Hammond Depot is stored in a single warehouse in the central portion of the site. Loading of the thorium nitrate containers in the warehouses onto trucks for transport would occur adjacent to surrounding roadways. Loading materials stored at the depot onto trucks is a common activity occurring in the surrounding area. Species in the vicinity are habituated to such routine activities.

Because no direct impacts to any areas on or surrounding the Hammond Depot are expected from the action of loading and moving thorium nitrate, there would be no significant adverse impacts to rare, threatened, or endangered species. No federally protected endangered or threatened species are known to occur on the depot site (USFS 1998b). Although Wolf Lake may serve as habitat for many wildlife species, habitat containing all the characteristics needed to support viable populations for rare, threatened, or endangered species is not present at the Hammond Depot (USFS 1998b).

The interstate highway routes and railway routes connecting Curtis Bay and Hammond Depots with NTS do not support suitable habitat containing all the characteristics needed for viable populations of federally listed threatened or endangered species. Because of the absence of suitable habitat, transporting the thorium nitrate stockpile would be expected to produce no significant impacts to any threatened or endangered species along the transportation route.

Accidents that could occur during transport of the thorium nitrate stockpile to NTS might result in the contents of one or more drums of thorium nitrate being released into the environment along the transportation corridor. The DNSC's thorium nitrate is made up of solid, dense pieces ranging in size from larger than a half-dollar to the size of the container (a solid block). Even if a drum were ruptured, the thorium nitrate would not move far. Because of its color (white) and its radioactive signature, a spill of thorium nitrate could be readily identified and cleaned up.

For thorium nitrate, transport and accumulation in the food chain determine the potential for significant adverse impacts. Normally, thorium compounds will not be transported long distances in soil; thorium attaches readily to soil (ATSDR 1990). Thorium does concentrate in plants. However, there is no evidence that plants are harmed by an uptake of thorium. The concentration of thorium does not increase (biomagnify) in predators when they consume contaminated prey (ATSDR 1990). Hence, there would be no expected significant adverse impacts to ecological resources from releases of thorium nitrate.

The NTS EIS (DOE 1996) and Supplement Analysis (DOE 2002a) report that disposal activities, including truck traffic, have had no adverse impacts to species at NTS, including threatened and endangered species. To ensure that no adverse impacts occur to threatened and endangered species, the NTS EIS (DOE 1996, Vol. 2) describes a resource management plan that includes measures to protect the endangered desert tortoise. Among the protection measures are NTS worker training and prevention of encroachment on critical habitat. Therefore, the disposal of about 13,000 yd^3 (9,900 m^3) of LLRW from DNSC, roughly 15% of the LLRW that was disposed of at NTS during FY 2002 (DOE 2003), would be expected to have no additional impact on species living at NTS beyond those impacts analyzed in the NTS documents. Hence, the proposed action would have no significant adverse impacts to any threatened or endangered species on the storage depots, along the transportation routes, or at NTS. DNSC shipments of thorium nitrate would utilize transportation routes previously analyzed in the Supplement Analysis (DOE 2002a).

3.2.3 Potential Impacts of the No-action Alternative

Ecological resources at the depots would be expected to experience no adverse impacts as a result of the no-action alternative as long as the thorium nitrate remains within the warehouses. Similarly, ecological resources at NTS would not be impacted by the no-action alternative.

During extreme weather events, including tornadoes, hurricanes, floods, and snow storms, there is a very small probability that the contents of one or more drums of thorium nitrate might be released into the environment where it would be accessible to ecological resources. Section 3.11.1 discusses the frequency of extreme weather events near both depots. As discussed in Section 3.2.2, ecological resources would be expected to experience no significant potential adverse impacts from releases of thorium nitrate to the environment.

3.3 WATER RESOURCES

3.3.1 Existing Environment

Both depots border bodies of water: Back, Curtis, and Furnace creeks for Curtis Bay Depot and Wolf Lake for Hammond Depot (see Figs. 1 and 2). In the vicinity of the depots, there are larger bodies of water. Chesapeake Bay is about 8 miles (13 km) from Curtis Bay Depot, and Lake Michigan is about 2.5 miles (4.0 km) from Hammond Depot. Current activities at both depots do not adversely impact either of these bodies of water.

At Curtis Bay Depot, groundwater occurs in the surficial sediments overlying shallow clay. Groundwater occurs 11–16 ft (3–5 m) below the surface in the eastern portion of the depot, and 20–40 ft (6–12 m) below the surface in the western portion (Parsons 2000). The flow of the shallow aquifer is generally from west to east towards Curtis Bay. However, there may be components of groundwater flow which move westward with discharge to Back Creek.

Regional shallow groundwater around Hammond Depot flows north-northeast, toward Lake Michigan. However, groundwater beneath Hammond Depot may flow toward and discharge into Wolf Lake, which lies adjacent to the west side of site (Parsons 2001). Prior to filling the area, the Hammond Depot site was a wetland adjacent to Wolf Lake.

NTS is classified as a transitional desert (it is located between the Mojave and Great Basin deserts). Surface water at NTS is transitory (DOE 2001a). In the valleys where the LLRW disposal sites are located, there is very limited annual precipitation: 3-4 in. (8-10 cm). Surface runoff in the valleys occurs via ephemeral streams into dry lake beds (playas). The net flux of water at NTS is upwards because evapotranspiration vastly exceed precipitation (DOE 2001a). Studies conducted in calendar years 2000 and 2001 show that rain water does not penetrate more than 3 ft (~1 m) beneath the surface (DOE 2001c and DOE 2002b). The groundwater beneath Area 5 is 770-888 ft (235-271 m) (DOE 2000a) below the surface, and groundwater beneath Area 3 is about 1,600 ft (490 m) (DOE 2000b) below the surface.

3.3.2 Potential Impacts of the Proposed Action

There are no wet processes associated with the proposed action at either depot. All potable water would be purchased in containers and brought to the depots. The amount of water and other liquids to support 14 workers for approximately eight months at Curtis Bay Depot and eight workers for approximately three months at Hammond Depot would be relatively small, about 6,000 gal (23,000 L). Worker sanitary wastes, about 8,000 gal (30,000 L) would be collected in portable toilets and disposed of in publicly owned treatment works. The impacts from this small volume of wastes would be insignificant. The proposed action would have insignificant, short-term impacts on water resources at either depot.

Because thorium nitrate is a solid, as opposed to a liquid or gas, accidental spills of thorium nitrate during drum handling, if any were to occur, would be contained and cleaned up quickly; there would be no potential impacts to nearby bodies of water. Any spills of fuels from materials handling equipment or transport vehicles would be contained and cleaned up quickly. Back, Curtis, and Furnace creeks and Wolf Lake are over 100 yd (91 m) from the warehouses containing thorium nitrate, as well as from where the proposed action would be conducted. Consequently, there would be no significant adverse impacts to surface water or groundwater on the depots.

Accidents that occur during transport of the thorium nitrate stockpile to NTS may result in the contents of one or more drums of thorium nitrate being released into a body of water along the transportation corridor.

Because thorium is a massive atom, any thorium nitrate that impinges upon surface water or groundwater would rapidly fall to the bottom. Thorium has a very high affinity for soil versus water; hence, it would adsorb onto soils and rocks beneath the water. Therefore, thorium would not progress far from the point at which it enters the water; it would be localized and immobile. Because of its radioactive signature, concentrations of thorium would be easy to locate. Cleanup would be relatively easy because of the localization and adsorption onto soil and rocks. There would be no significant potential adverse impacts to surface water or groundwater along the transportation corridors.

The DOE Final Programmatic EIS (FPEIS) for Waste Management (DOE 1997) examined the potential impacts resulting from a massive (an entire trainload) spill of radioactive wastes into streams of varying sizes and flow rates. The DOE document determined that only in the very smallest streams would there be discernable impacts, and there would be no significant adverse impacts to any of the streams.

The drums of thorium nitrate do not contain free liquids, and the cargo containers loaded with drums of thorium nitrate would be placed at least 40 ft (12 m) below the surface in either Area 3 or Area 5 at NTS. This burial method is consistent with the design parameters for and burial of other thorium-containing materials at these sites (Shott et al. 1998; DOE 2000c; DOE 2001b). Because the net flux of water is upwards and the depths to groundwater are large, there would be no potential adverse impacts to groundwater at NTS from the disposal of thorium nitrate.

3.3.3 Potential Impacts of the No-action Alternative

The water resources at the storage depots and at NTS would be unaffected by the continued presence of thorium nitrate in warehouses at the depots. There would be no significant adverse impacts expected to water resources as long as the thorium nitrate is contained within the warehouses.

During extreme weather events, including tornadoes, hurricanes, floods, and snow storms, there is a very small probability that the contents of one or more drums of thorium nitrate might be released into the environment and reach nearby surface water or groundwater. Section 3.11.1 discusses the frequency of extreme weather events near both depots. As discussed in Section 3.3.2, there would be no significant potential adverse impacts to surface water or groundwater from releases of thorium nitrate to the environment.

3.4 WASTE DISPOSAL

3.4.1 Existing Environment

Currently, non-radioactive wastes from both depots are disposed of at local landfills. The Hammond Depot disposes of its non-radioactive wastes in the Newton County landfill, approximately 40 miles (65 km) south of the depot. Curtis Bay Depot disposes of its non-radioactive wastes in the City of Baltimore landfill at 6100 Quarantine Road, about 3 miles (5 km) east of the depot. Radioactive wastes generated at either depot are disposed of at licensed commercial facilities. NTS has onsite facilities for disposing of radioactive wastes: Area 3 and Area 5 Radioactive Waste Management Sites.

3.4.2 Potential Impacts of the Proposed Action

After the transfer of ownership of the thorium nitrate stockpile (excess source material) from DNSC to DOE, the thorium nitrate would be disposed of at NTS. Secondary radioactive wastes produced during the proposed action would either be disposed of at NTS or at licensed commercial facilities. These secondary radioactive wastes could include contaminated pallets, personal protective equipment, tools, and drums. Non-radioactive wastes would be disposed of at the local landfills used by the depots. The expected volume of non-radioactive wastes, up to 1000 yd^3 (760 m^3), is a relatively small quantity that would cause no significant adverse impacts.

Over a 10-year period beginning in FY 2002, NTS is prepared to accept 677,000 yd^3 (518,000 m^3) of LLRW generated by DOE operations throughout the United States. Hence, the roughly 13,000 yd^3 (9,900 m^3) of thorium nitrate (excess source material) and secondary radioactive wastes shipped from DNSC in cargo containers would comprise roughly 2% of the LLRW disposed of at NTS during the 10-year analysis period and would be expected to pose no significant adverse impacts.

3.4.3 Potential Impacts of the No-action Alternative

At both depots, small quantities of radioactively contaminated equipment and protective clothing [less than 1 yd^3/year (0.7 m^3/year)] would continue to be generated as a result of maintenance activities. These materials would be disposed of at licensed commercial disposal facilities. Because the quantities would be small, there would be no significant adverse impacts to the receiving facilities or the storage depots.

Continued storage of thorium nitrate at the depots would have no impacts on NTS.

3.5 SOCIOECONOMICS

3.5.1 Existing Environment

Currently, less than 10% of one person-year is associated with the storage of thorium nitrate at both the Hammond and Curtis Bay Depots. The Curtis Bay Depot has a permanent staff of two employees, who will be reassigned and not replaced by the end of FY 2003. Staff from the Binghamton, New York, Depot will make periodic trips to the Curtis Bay Depot to conduct facility inspections and out-loading of stored commodities. The Curtis Bay Depot will continue to maintain a permanent armed guard service at the Depot until it closes. The Hammond Depot has eight employees permanently assigned to the Depot.

3.5.2 Potential Impacts of the Proposed Action

The proposed action would result in no notable change in the numbers of permanent staff personnel at the two storage facilities. Any DNSC personnel required to be at Curtis Bay Depot during the proposed action would be there for short periods. Short-term increases in utility use at the two depots may result from the proposed action. There would be a temporary positive impact on the local economies around the two depots caused by the presence of approximately 14 temporary workers at Curtis Bay Depot for about 8 months, any temporary DNSC personnel for short durations during the 8-month period, and approximately 8 temporary workers at Hammond Depot for about 3 months. All these workers would require food and lodging. Additionally, there would be relatively small, but beneficial, impacts on the local economies resulting from purchases of equipment and fuel. Because of the small magnitude and short duration of the proposed action, there would be no adverse impacts to social services.

It is estimated that approximately 240 trucks would be needed to deliver the thorium nitrate stockpile to NTS. This equates to about 14% of the number of trucks that delivered LLRW to NTS during FY 2002 (DOE 2003). There would be, at most, a very minor increase to road wear at NTS. Truck traffic would produce no significant adverse impacts.

3.5.3 Potential Impacts of the No-action alternative

The current level of expenditures for local services and equipment in the communities around the depots would continue. There would be no adverse impacts to the communities around the depots. With the no-action alternative, NTS would continue to accomplish its mission of LLRW disposal, and no adverse impacts would result.

3.6 HUMAN HEALTH AND SAFETY

3.6.1 Existing Environment

Currently, workers at the Curtis Bay and Hammond Depots examine the stockpile to ensure that it remains in good condition and that the inventory location and count are correct. The inspections are conducted every 6 months at Curtis Bay and annually at Hammond Depot. According to DNSC records, these actions result in typical radiation doses of less than 0.2% of the annual limit for radiation workers [5,000 mrem (50 mSv)] prescribed in NRC regulations (10 CFR §20.1201) at either depot. Because the drums are not routinely repositioned or handled, the potential for any industrial-type accidents to occur is greatly reduced.

3.6.2 Potential Impacts of the Proposed Action

In addition to the project-specific health and safety measures included in the proposed action, compliance with all OSHA, NRC, and DOE regulations for the type of work associated with the stockpile disposal will be required. Appendix C provides a representative list of the regulations, statutes, and federal orders that are relevant to the proposed action.

All workers would be trained in the potential hazards associated with the proposed action. Additionally, each worker would be issued and required to wear personal protective equipment appropriate to the hazards that may be encountered during the proposed action. Some of the potential hazards to workers associated with the proposed action are listed in Section 2.1. Required training for workers would minimize the potential risks to workers, and that training includes the general categories listed in Section 2.1. The potential hazards listed in Section 2.1 would pose risks to only one or a small number of on-site workers. To ensure the prompt handling of such potential hazards, the contractor(s) performing work at the Curtis Bay and Hammond Depots would be required to have health and safety plans for addressing these potential hazards.

During the proposed action at the DNSC Depots, the operations crews have the potential to receive the largest radiation doses. The maximally exposed crew members would be forklift drivers. In accordance with the best industry practices, the dose will be kept as low as reasonably achievable (ALARA). Administrative controls (e.g., platooning) will ensure that workers would receive a radiation dose well below the allowable annual limit, 5000 mrem (50 mSv) (10 CFR §20.1201), to provide assurance that no adverse impacts would occur.

The radiation dose rate is substantially lower outside the warehouses; therefore, the expected annual dose to each forklift driver loading drums into the cargo containers would be substantially below the doses estimated for the forklift drivers working inside the warehouses. All other workers would be expected to receive lower radiation doses than the forklift drivers; hence, radiation exposure would not be expected to significantly impact the workers at the DNSC Depots, assuming the principles of ALARA will be followed.

NTS plans to place the cargo containers directly into the disposal cell from the trailer. [For a discussion of the disposal cell structure at NTS, see DOE (2001b) and Shott (1998)]. Lifting the cargo container filled with drums of thorium nitrate from the trailer and placing it immediately in the disposal cell will substantially reduce the amount of time during which the workers would be exposed to the radiation being emitted from the packaged thorium nitrate. This method of disposal minimizes radiation exposure to workers at NTS; dose reduction is consistent with the principle of ALARA. Therefore, disposal of thorium nitrate would be expected to produce no significant adverse impacts to workers at NTS.

The DOT regulations require that the radiation levels during transportation may not exceed 2 mrem/h (0.02 mSv/h) in any normally occupied space unless the carriers operate under the provisions of a state or federally regulated radiation protection program and their drivers wear radiation dosimetry devices. Conservative estimates for the dose in the truck cab give the dose to be roughly 3 mrem/h (0.03 mSv/h) for the shipments carrying the largest permissible loads of MD-2 drums. Only carriers that comply with these DOT regulations [49 CFR §173.441b(4)] for this type of material will be permitted to transport the thorium nitrate.

Consistent with the requirement for the forklift drivers and the principle of ALARA, administrative controls (e.g., platooning) will be used to ensure that radiation doses received by the tractor/trailer drivers from the proposed action will remain well below annual allowable limits. The proposed action would be conducted in a manner designed to protect the tractor/trailer drivers from being exposed to significantly adverse impacts. Hence, there would be no expected significant adverse impacts to the tractor/trailer drivers.

3.6.3 Potential Impacts of the No-action Alternative

Under the no-action alternative, depot workers would continue receiving the radiation doses they do presently. These doses are acceptable for radiation workers. Hence, there would be no significant adverse impacts. Under the no-action alternative, the workers at NTS would receive no radiation doses from the thorium nitrate; therefore, there would be no impacts to these workers.

3.7 ENVIRONMENTAL JUSTICE

3.7.1 Existing Environment

Both depots are located in industrial areas; the nearest residents are about 530 ft (160 m) from the site boundary at both Curtis Bay Depot and Hammond Depot. At Hammond Depot, the nearest residence is over 1700 ft (520 m) from the warehouse where thorium nitrate is stored. At Curtis Bay Depot, the nearest residence is over 2500 ft (760 m) from the warehouses where thorium nitrate is stored.

Curtis Bay Depot is located in Anne Arundel County, and the depot is less than 0.5 mile (0.8 km) from Baltimore County. According to data extracted from the 2000 census, there are 51,141 residents within 3.1 miles (5.0 km) of Curtis Bay Depot. According to information prepared by the State of Maryland from the 2000 census data (Maryland 2002), minorities make up over

13.6% of the population in Anne Arundel County, over 20.1% of the population in Baltimore County, and over 68.3% of the population in the City of Baltimore. Data extracted from the 2000 census show that persons below the poverty level make up over 0.5% of the population in Anne Arundel County, over 6.4% of the population in Baltimore County, and over 22.9% of the population in the City of Baltimore.

Hammond Depot is located in Lake County, Indiana, and the depot is less than 0.1 mile (0.2 km) from Cook County, Illinois. The 2000 census lists 85,269 residents within 3.1 miles (5.0 km) of Hammond Depot. According to information prepared by the State of Indiana from the 2000 census data (Indiana 2002), minorities make up 33.3% of the population in Lake County. Similarly, information prepared by the State of Illinois (Illinois 2002) lists minorities as making up 41.7% of the population in Cook County. Data extracted from the 2000 census show that persons below the poverty level make up over 12.2% of the population in Lake County, Indiana and over 13.4% of the population in Cook County, Illinois.

NTS is located in Nye County, Nevada, immediately adjacent to Clark and Lincoln counties (see Fig. 3). Based upon 2000 census data, the State of Nevada lists minorities as making up 7.5% of the population in Nye County, 25% of the population in Clark County, and 6.7% of the population in Lincoln County (Nevada 2002). Data extracted from the 2000 census show that persons below the poverty level make up over 10.7% of the population in Nye County, over 10.6% of the population in Clark County, and over 16.4% of the population in Lincoln County. There are no residential populations within 21 miles (34 km) of the potential disposal site in Area 5 or within 33 miles (53 km) of the potential disposal site in Area 3. NTS is surrounded on three sides by the Nevada Test and Training Range (formerly Nellis Air Force Range) (see Fig. 3).

3.7.2 Potential Impacts of the Proposed Action

There are minority and economically disadvantaged populations within 3.1 miles (5.0 km) of the storage depots. However, the analyses in this EA have identified no significant adverse impacts resulting from implementation of the proposed action. Hence, there would be no disproportionately high and adverse impacts to minority or economically disadvantaged populations. Further, completing the proposed action would remove the thorium nitrate from its current locations and would eliminate the potential for any future impacts.

The remoteness of the NTS from populations and the absence of off-site radiological and groundwater impacts caused the NTS EIS (DOE 1996) to conclude that there are no environmental justice impacts to off-site populations. The NTS EIS identifies Native American concerns resulting from operations at NTS. These concerns are addressed in the resource management plan (DOE 1996, Vol. 2) by encouraging Native Americans to participate in developing and implementing an ecosystem management plan that incorporates Native American ecosystem perspectives. The potential impacts from the proposed action would be a small increment within the potential impacts addressed in the NTS EIS and the NTS resource management plan.

Potential transportation impacts to environmental justice are addressed in Section 7 of the DOE Final Programmatic EIS (FPEIS) for Waste Management (DOE 1997). The FPEIS evaluated the potential impacts from transporting about 78 million lb (35 million kg) of LLRW from DOE sites to NTS. In the FPEIS, the potential impacts from transportation of LLRW were not expected to result in disproportionately high and adverse impacts to minority or economically disadvantaged populations.

3.7.3 Potential Impacts of the No-action Alternative

Under the no-action alternative, there would continue to be no adverse impacts to the human environment. Hence, there would be no disproportionately high and adverse impacts to minority or economically disadvantaged populations.

3.8 CULTURAL RESOURCES

3.8.1 Existing Environment

At neither of the DNSC depots are there identified historic resources suitable for listing in the National Register of Historic Places; both depots are in previously disturbed industrial areas. Archaeologists have recorded and inspected five archaeological sites at the Curtis Bay Depot. Insignificant artifacts were recovered, and they are curated at the Maryland Archaeological Conservation Laboratory in Baltimore (Whetsell and Eberlin 2000). Because of its method of construction, there would be no recoverable archaeological artifacts at Hammond Depot.

3.8.2 Potential Impacts of the Proposed Action

Transporting the thorium nitrate stockpile, including the 10 drums of converted thorium nitrate, across the United States would not adversely impact any cultural, archaeological, or historic resources along the transportation route. Disposing of thorium nitrate and the ten drums of conversion products at NTS would not adversely impact any cultural, archaeological, or historic resources. Hence, no significant adverse impacts would be anticipated to any cultural, archaeological, or historic resources.

3.8.3 Potential Impacts of the No-action Alternative

Under the no-action alternative, no significant adverse impacts would be anticipated to any cultural, archaeological, or historic resources.

3.9 NOISE

3.9.1 Existing Environment

The NTS EIS (DOE 1996) describes the noise at NTS as characteristic of uninhabited areas except near roads and experimental facilities, where noisy equipment and occasional explosions occur. Both DNSC depots exist within industrial areas, with the normal levels of noise produced by transportation and material moving equipment.

3.9.2 Potential Impacts of the Proposed Action

Because neither depot has sufficient electrical service available for the proposed action, diesel powered electrical generators would be used. The generators would be equipped with standard noise reduction equipment, and they would be operated only during working hours.

Because there would be no extraordinarily noisy equipment used, the type and number of vehicles would be relatively small, and the duration of the project would be short, work at the depots and transportation of the stockpile to NTS would not be expected to produce significant adverse noise impacts. The NTS EIS (DOE 1996) reports no significant noise impacts resulting from about 50 trucks per week bringing LLRW for disposal. Therefore, it would be expected that the proposed action would produce no significant noise impacts at NTS.

3.9.3 Potential Impacts of the No-action Alternative

Operations at the depots would continue with occasional trucks and trains and their typical noises. Noise would be expected to produce no significant adverse impacts.

3.10 TRANSPORTATION

3.10.1 Existing Environment

The DNSC depots are served by roads that provide them with ready access to the interstate highway system or to railways. Both depots are located in areas where normal traffic is many times greater than the traffic entering and exiting the depots. The NTS EIS (DOE 1996) notes that on-site roads are well maintained and that U.S. Highway 95 provides the only access to NTS.

3.10.2 Accident Analysis

For the proposed action, accidents during transportation would produce the greatest potential for adverse impacts. This analysis addresses potential impacts only to individuals because all credible accidents are sufficiently small that they would not produce large or permanent impacts on a greater scale in the human environment.

The DOE FPEIS addresses the transportation-related impacts to the public along transportation corridors. Centralized Alternative 2 models the transport of all the LLRW generated at DOE sites to NTS. The model assumes that there would be 505 million miles (813 million km) of truck transport, resulting in the fatalities shown in Table 2—an accident fatality rate of approximately 7 fatalities per 100 million miles (160 million km). The model assumes that there would be 219 million miles (352 million km) of rail transport resulting in one fatality, an accident fatality rate of approximately 0.5 fatalities per 100 million miles (160 million km). All these potential fatalities would result from injuries sustained during the accidents. The DOE FPEIS determined that less than one potential fatality would result from radiation exposures that occurred during truck or train accidents.

The fatality rate for truck accidents used in the DOE FPEIS is conservatively high when compared with recent data. During calendar year 2001, large trucks, [i.e. trucks with a gross vehicle weight rating greater than 10,000 lb (4,500 kg)] traveled approximately 207,686 million miles (334,239 million km) in the United States (FMCSA 2003). Accidents that involved large trucks resulted in 5,082 fatalities, a rate of approximately 2.4 fatalities per 100 million miles (160 million km).

Table 2. Potential transportation-related fatalities

		Estimated number of radiological fatalities from radiation-induced latent cancer			Estimated number of non-radiological fatalities	
	Shipment miles (millions)	Normal operations public	Normal operations workers	Exposure from traffic accidents	Fuel emissions	Injury from traffic accidents
Potential fatalities from transporting DOE's low-level radioactive waste						
DOE truck transport to NTS[a]	505	9	6	<1	3	35
DOE rail transport to NTS[a]	219	1	1	<1	2	1
Truck transport of all DOE wastes to NTS using recent U.S. Department of Transportation statistics	505	NA[b]	NA	NA	NA	12[c]
Rail transport of all DOE wastes to NTS using recent U.S. Department of Transportation statistics	219	NA	NA	NA	NA	180[c]
Potential fatalities from transporting DNSC's thorium nitrate stockpile						
Truck transport of thorium nitrate to NTS	<0.5	NA	NA	NA	NA	<1[d]
Rail and truck transport of thorium nitrate to NTS	<0.5	NA	NA	NA	NA	<1[d]

[a]Centralized Alternative 2 from the *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste*, DOE/EIS-0200-F, Department of Energy, Office of Environmental Management, Washington, D.C.

[b]NA = not applicable. There was insufficient information to compute the statistic.

[c]The most recent rates for fatalities resulting from per 100 million miles (160 million km) reported by the U.S. Department of Transportation are 2.4 for large truck [> 10,000 lb (4,500 kg)] transport, "Large Truck Crash Facts 2001," and 82.3 for rail transport (Ellis 2003).

[d]The actual values calculated for the proposed action would be <0.04 but, for consistency with the designations DOE used in its analysis, all expected fatalities <0.4 are reported as <1.

The fatality rate used for train accidents in the DOE FPEIS is lower than recent data. During calendar year 2001, trains in the United States traveled approximately 626 million miles (1,007 million km) on mainline track (Ellis 2003). Accidents that involved trains resulted in 515 fatalities, a rate of approximately 82.3 fatalities per 100 million miles (160 million km).

Using 2001 DOT accident fatality rates, the disparity between highway and rail transport shown in the DOE FPEIS and Table 2 is reversed. Rail transport is no longer favored by a ratio of 35 to 1 (the ratio of fatalities from accidents). The new ratio is 12 to 180 (1 to 15). Rail transport would result in 15 times more accident fatalities than highway transport.

The fatality rates used in the DOE FPEIS (DOE1997) per 100 million miles (160 million km) were applied to the transport of the thorium nitrate to NTS. The total transportation distance for the thorium nitrate stockpile would be less than 0.5 million miles (0.8 million km). From the information in Table 2, the transportation distances in the DOE FPEIS are over 500 times the transportation distances for the thorium nitrate stockpile. Because the DOE FPEIS concluded that there would be less than one expected fatality resulting from radiation exposures caused by accidents during its much larger shipping campaign, there would be less than one expected fatality from radiation exposure caused by accidents during transportation of the thorium nitrate stockpile.

The expected fatalities resulting from transportation of the thorium nitrate stockpile are presented in Table 2. The number of expected fatalities resulting from injuries received in truck accidents was computed from the value reported by DOE as

$$(7 \text{ fatalities}/100 \text{ million miles}) \times (<0.5 \text{ million miles}) < 0.04 \text{ fatalities.}$$

This value is reported in Table 2 as <1 for consistency with the reporting method used in the DOE FPEIS. The comparable number of expected fatalities resulting from injuries received in train accidents was computed from the fatality rate reported by DOE as

$$(0.5 \text{ fatalities}/100 \text{ million miles}) \times (<0.5 \text{ million miles}) < 0.003 \text{ fatalities.}$$

Table 3 presents DOT data for transportation-related accident injuries that did not result in fatalities during calendar year 2001. The expected injuries resulting from accidents during transportation of the thorium nitrate stockpile to NTS were computed and the results are given in Table 3. Less than 1 injury would be expected from transporting the thorium nitrate stockpile to NTS regardless of the transport mode (see Table 3).

Table 3. Transportation-related incidents (excluding fatalities)

	Shipment miles (millions)	Persons injured
Total national truck transport	207,686	127,989[a]
Total national rail transport	626	970[b]
Truck transport of thorium nitrate to NTS	<0.5	<0.3
Rail and truck transport of thorium nitrate to NTS	<0.5	<0.8

[a]The data for injuries resulting from accidents involving large trucks [> 10,000 lb (4,500 kg)] are reported by the U.S. Department of Transportation, "Large Truck Crash Facts 2001."

[b]The data for injuries resulting from accidents involving trains on mainline tracks during 2001 were extracted from the Federal Railroad Administration database (Ellis 2003).

3.10.3 Potential Impacts of the Proposed Action

DNSC shipments of thorium nitrate would utilize transportation routes previously analyzed in the Supplement Analysis (DOE 2002a). The Supplement Analysis concluded that no significant adverse impacts would arise from transportation of the anticipated number of shipments to NTS, and the thorium nitrate stockpile is included in the Supplement Analysis. Both DNSC depots are located within industrial areas; only vehicles or equipment types that are routinely used in such areas would be used during the proposed action; and the number of trucks per week (8-10) would be small compared to normal traffic near either depot. Hence, transportation of the thorium nitrate from the depots to the primary transportation routes and along the routes to NTS would be expected to produce no significant adverse impacts.

The thorium nitrate stockpile would be transported to NTS solely on trucks or by a combination of trains and trucks. Only conventional tractor/trailer rigs would be used to transport the thorium nitrate stockpile on the highways, and they would comprise about 25-30% of similar type vehicles entering NTS during the period of the proposed action. Also, only conventional railcars would be used to transport the thorium nitrate stockpile. No rail transport of radioactive materials may occur within the State of Nevada. Therefore, if rail transport were to be used, it must be combined with truck transport.

There would be less than one expected fatality and less than one expected injury resulting from traffic accidents involving either truck transport or mixed rail and truck transport of thorium nitrate to NTS. The expected number of fatalities and injuries resulting from the proposed action (less than one in each case) is substantially lower than the number of expected fatalities determined to be not significant in the DOE FPEIS. Hence, transportation of thorium nitrate to NTS would not be expected to result in significant adverse impacts. The NTS EIS (DOE 1996) reports no significant adverse impacts from existing and predicted on-site and off-site road use.

The potential for significant adverse impacts occurring from spills of thorium nitrate, including transportation-related spills, is discussed in Sections 3.2 and 3.3. No significant adverse impacts were identified in the cited sections. To ensure the timely cleanup of a spill, if it should occur, the following criteria are required of the carrier.

- The carrier will provide exclusive use shipments and satellite tracking of all shipments.
- The carrier will be authorized by the Research and Special Programs Administration of DOT to transport the radioactive material described
- The location of each shipment in transit will be updated approximately every 30 minutes.
- All drivers are certified as radioactive and hazardous materials transporters.
- The carrier will establish a 24-hour Emergency Response Plan that includes the services of a hazardous materials cleanup company.

3.10.4 Potential Impacts of the No-action Alternative

The depots would continue operations at approximately the current levels of traffic. There would be no expected significant adverse impacts to traffic near either depot. There would be no adverse impacts to traffic at NTS resulting from the no-action alternative.

3.11 AIR QUALITY

3.11.1 Existing Environment

Air quality at the Curtis Bay and Hammond Depots is characteristic of the large industrial areas surrounding them. Both areas are classified by the EPA as nonattainment for ozone but are in attainment for all other criteria pollutants. As reported in the NTS EIS (DOE 1996), the air quality at NTS is quite good, characteristic of an uninhabited area. The area is classified by the EPA as attainment for all criteria pollutants.

Extreme meteorological events may be expected infrequently in the Baltimore and Chicago areas. The quantity of precipitation occurring during extreme events has been estimated by the National Weather Service according to expected frequency of occurrence (NWS 2003). The amount of precipitation during a 24-hr period that would be expected to occur, on average, once every 10 years is 5 in. (13 cm) in the Baltimore area and 4 in. (10 cm) in the Chicago area. The quantity of 24-hr precipitation that would be expected to occur, on average, once every 100 years is 7.5 in. (19 cm) in Baltimore and 5.5 in. (14 cm) in Chicago.

With regard to snowfall, Baltimore set a new snowfall record with the President's Day storm that occurred on February 15–18, 2003. A total of 28 in. (71 cm) of snow fell, making this storm the top snowstorm on record. The greatest snowfall amount recorded in Chicago during a snowstorm was 23 in. (58 cm), which occurred on January 26–27, 1967.

Tornadoes occasionally occur in both the Baltimore and Chicago areas. Based on the 20-year period of record between 1980 and 1999, the mean number of days per year with one or more tornadoes within 25 miles (40 km) of Baltimore is 0.7 (NSSL 2003). For Chicago, the mean number of days annually is 0.9. Therefore, for both areas, a tornado can be expected within 25 miles (40 km) of the depots nearly once per year. Based on the same period of record, the mean number of days per year experiencing thunderstorms with wind speeds of at least 58 mph (93 km/h) within 25 miles (40 km) of the depots is 5.5 in Baltimore and 4.5 in Chicago.

The probability of a hurricane striking the Baltimore area is small. Annual probabilities have been derived of a hurricane passing within 75 miles (121 km) of locations along the Atlantic coastline (Sheets and Williams 2001). For Ocean City, Maryland, the nearest given coastline location to Baltimore, the annual probability of a hurricane [with maximum sustained wind speeds of at least 74 mph (119 km/h)] is 4.2%. Ocean City's annual probability of a major hurricane [with maximum sustained wind speeds of at least 111 mph (179 km/h)] is 0.9%. Because Baltimore is located inland, where winds typically dissipate quickly following a hurricane's landfall, its probabilities would be less. Historically, two hurricanes (in 1878 and 1893) have passed within 75 miles (121 km) of Baltimore during the 150-year period between 1851 and 2001 (NCSC 2003). However, many tropical storms, with maximum sustained wind speeds between 39 and 73 mph (63 and 117 km/h), have passed within 75 miles (121 km) of Baltimore during this period; the last two were Bertha in 1996 and Floyd in 1999. Frequently, these tropical storms were formerly hurricanes that lost their strength following landfall.

Based upon historical records, the probability of a hurricane striking the Chicago area is vanishingly small. However, the remnants of tropical storms have passed through the area on extremely rare occasions.

3.11.2 Potential Impacts of the Proposed Action

The proposed action would take place without opening the drums of thorium nitrate; there would be no emissions from the drums. The weekly truck traffic (8–10) would be inconsequential for an industrial area and for the national highway systems and would comprise about 25–30% of the typical disposal traffic at NTS. The NTS EIS reports no significant air quality impacts resulting from about 50 trucks per week bringing LLRW to NTS for disposal. Hence, the proposed action would be expected to produce no significant adverse impacts to air quality.

3.11.3 Potential Impacts of the No-action Alternative

Under the no-action alternative, current levels of depot activities would continue, and no significant adverse impacts would be anticipated to air quality. No adverse impacts to air quality at NTS would result from the no-action alternative.

3.12 CUMULATIVE IMPACTS

3.12.1 Curtis Bay Maryland Depot

While the proposed action is being performed, there would be increased transportation activity on the depot. Presently there are approximately 5–10 tractor/trailer rigs entering and leaving the depot each day. During the period of operations for the proposed action, the traffic on Curtis Bay Depot that is unrelated to the proposed action may remain the same. Cumulatively, there may be 6–12 total tractor/trailer rigs entering and leaving the depot daily, an increase of 17–20%. Additionally there may be weekly arrival and departure of railway gondola cars. While greater than present transportation activity levels, these levels would not present significant adverse impacts to the local transportation infrastructure that is sized for an active industrial area. The activities at the depot would be intermittent, and the duration of activities would be brief. Closing Curtis Bay Depot would make the land available for commercial use with the potential for significant beneficial impacts. Hence, no significant adverse cumulative impacts would be expected to human health or the human environment, and there could be significant beneficial cumulative impacts.

3.12.2 Hammond Indiana Depot

During the proposed action, other transportation activities on the depot would continue. There may be 5–10 tractor/trailer rigs not related to the proposed activity entering and leaving the depot each day. Cumulatively, there may be 6–12 total rigs; an increase of 17–20%. This small increase would be expected to produce no significant adverse impacts to the local transportation infrastructure. The depot is scheduled for closure; hence, any activities there are transitory and would not continue indefinitely. Closing Hammond Depot would make the land available for commercial use with the potential for significant positive impacts. Hence, no significant adverse cumulative impacts would be expected to human health or the human environment, and there could be significant positive cumulative impacts.

3.12.3 Nevada Test Site

The NTS EIS (DOE 1996) and the Supplement Analysis (DOE 2002a) both conclude that, for 10 years into the future, the suite of activities, including the proposed action, envisioned to be carried out at NTS would have no lasting adverse impacts on human health and the human environment. Additionally, a performance assessment for the Area 5 Waste Management Site determined that the disposal of LLRW would have no adverse impacts to the human environment through the analysis period of 1000 years (Shott et al. 1998).

3.12.4 Transport Routes

The total truck transport distance for the proposed action, <0.5 million miles (<0.8 million km), would be less than 0.002% of the total large truck miles driven in the United States in calendar year 2001 (FMCSA 2003). The total rail/truck transport for the proposed action (assumed to be all rail transport), <0.5 million miles (<0.8 million km), would be less than 0.08% of the total rail miles traveled in the United States in calendar year 2001. All project-related transportation activities are short in duration. During the proposed action, an approximately 18-month period ending in calendar year 2005, no extraordinary uses would be expected for those local roads or portions of the interstate highway system that connect Curtis Bay Depot and Hammond Depot to NTS. Additionally no extraordinary uses would be expected for rail routes connecting intermodal transfer facilities near Curtis Bay Depot and Hammond Depot to intermodal transfer facilities in Utah, such as those at Rowley Junction, Utah [about 80 miles (130 km) south southeast of Salt Lake City] or Timpie, Utah [about 40 miles (65 km) west of Salt Lake City]. Based on the information given above, no cumulative adverse impacts would be expected along the transportation routes.

3.13 REFERENCES

ATSDR (Agency for Toxic Substances and Disease Registry) 1990. *Toxicological Profile for Thorium*, ATSDR, U.S. Public Health Service in collaboration with the U.S. Environmental Protection Agency, Oct. URL: http://www.atsdr.cdc.gov/toxprofiles/tp147.pdf (accessed Aug. 14, 2003).

Cash, C.M. 1998a. *Natural Resources Assessment for Defense Logistics Agency/Defense National Stockpile Center, Curtis Bay, Maryland*, U.S Forest Service, Gifford Pinchot National Forest, July.

Cash, C.M. 1998b. *Natural Resources Assessment for Defense Logistics Agency/Defense National Stockpile Center, Hammond, Indiana*, U.S. Forest Service, Gifford Pinchot National Forest, May.

DOE (U.S. Department of Energy) 1996. *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada*, DOE/EIS 0243, DOE, Nevada Operations Office, Las Vegas, Nev.

DOE (U.S. Department of Energy) 1997. *Final Waste Management Programmatic Environmental Impact Statement for Managing Treatment, Storage, and Disposal of Radioactive and Hazardous Waste*, DOE/EIS-0200-F, DOE, Office of Environmental Management, Washington, D.C.

DOE (U.S. Department of Energy) 2000a. *Area 5 Radioactive Waste Management Site*, URL: http://www.em.doe.gov/lfrg/ntsarea5.html, accessed July 21, 2003.

DOE (U.S. Department of Energy) 2000b. *Area 3 Radioactive Waste Management Site*, URL: http://www.em.doe.gov/lfrg/ntsarea3.html, accessed July 21, 2003.

DOE (U.S. Department of Energy) 2000c. *Low-Level Waste Program at the Nevada Test Site*, DOE/NV-657, DOE–Nevada Operations Office, Office of Public Affairs and Information, Las Vegas, Nev.

DOE (U.S. Department of Energy) 2001a. *Nevada Test Site Annual Site Environmental Report for Calendar Year 2001*, DOE/NV/11718-747, DOE/National Nuclear Security Administration, Nevada Operations Office, Las Vegas, Nev.

DOE (U.S. Department of Energy) 2001b. *Composite Analysis for the Area 5 Radioactive Waste Management Site at the Nevada Test Site, Nye County, Nevada*, DOE/NV-594, DOE-Nevada Operations Office, Las Vegas, Nev.

DOE (U.S. Department of Energy) 2001c. *Nevada Test Site 2000 Waste Management Monitoring Report, Area 3 and Area 5 Radioactive Waste Management Sites*, DOE/NV/11718-582, DOE/National Nuclear Security Administration, Nevada Operations Office, June.

DOE (U.S. Department of Energy) 2002a. *Supplement Analysis for the FEIS for the NTS and Off-Site Nevada Locations*, DOE/EIS-0243-SA-01, DOE/National Nuclear Security Administration, Nevada Operations Office, Las Vegas, Nev.

DOE (U.S. Department of Energy) 2002c. *Nevada Test Site 2001 Waste Management Monitoring Report, Area 3 and Area 5 Radioactive Waste Management Sites*, DOE/NV/11718-718, DOE/National Nuclear Security Administration, Nevada Operations Office, June.

DOE (U.S. Department of Energy) 2003. *Annual Report – FY 2002: Radioactive Waste Shipments to and from the Nevada Test Site*, DOE/National Nuclear Security Administration, Nevada Operations Office, Las Vegas, Nev.

Ellis, S., Federal Railroad Administration, electronic communication to J.W. Terry, Oak Ridge National Laboratory, August 14, 2003.

FMCSA (Federal Motor Carrier Safety Administration) 2002. *Large Truck Crash Facts 2001*, URL: http://www.ai.volpe.dot.gov/CarrierResearchResults/HTML/2001CrashFacts/01Table01.htm (accessed March 27, 2003).

FRA (Federal Railroad Administration) 2003. *Accident/Incident Overview 2002*, URL: http://safetydata.fra.dot.gov/OfficeofSafety/Query/Default.asp?page=statsSas.asp (accessed March 27, 2003).

Hylton, T.D. et al. 2003. *Thorium Nitrate Stockpile Drum Characterization Report*, ORNL/TM-2003/53, Oak Ridge National Laboratory, Oak Ridge, Tenn.

Illinois (State of Illinois) 2002. Census data, URL: http://www.illinoisbiz.biz/2000census/05017031.pdf (accessed May 13, 2003).

Indiana (State of Indiana) 2002. Census data, URL: http://www.stats.indiana.edu/profiles/pr18089.html (accessed May 13, 2003).

Maryland (State of Maryland) 2002. Census data, URLs: http://www.mdp.state.md.us/msdc/census/cen2000/housing_patterns/anne9000t.pdf and http://www.mdp.state.md.us/msdc/census/cen2000/housing_patterns/baco9000t.pdf (accessed May 13, 2003).

Mattus, C.H. et al. 2003. *Characterization of the Defense National Stockpile Center's Thorium Nitrate Stockpile*, ORNL/TM-2003/54, Oak Ridge National Laboratory, Oak Ridge, Tenn.

NCSC (NOAA Coastal Services Center) 2003. "Historical Hurricane Tracks," URL: http://hurricane.csc.noaa.gov/hurricanes/index.htm (accessed Aug. 28, 2003).

Nevada (State of Nevada) 2002. Census data, URLs: http://censtats.census.gov/data/NV/05032023.pdf (accessed May 13, 2003), http://censtats.census.gov/data/NV/05032017.pdf (accessed May 14, 2003), and http://censtats.census.gov/data/NV/05032003.pdf accessed May 14, 2003.

NSSL (National Severe Storms Laboratory) 2003. *Severe Thunderstorm Climatology*, URL: http://www.nssl.noaa.gov/hazard/totalthreat.html (accessed Aug. 28, 2003)

NWS (National Weather Service) 2003. "Rainfall Frequency Atlas Maps—Central and Eastern U.S.," in *Technical Paper No. 40, Rainfall Frequency Atlas of the United States*, URL: http://www.srh.noaa.gov/lub/wx/precip_freq/precip_index.htm (accessed Aug. 27, 003)

Parsons (Parsons Engineering Science, Inc.) 2000. *Site Investigation Report, Curtis Bay Depot, Curtis Bay, Maryland, Final,* prepared for U.S. Army Corps of Engineers Huntsville Center, Westmont, Ill., Aug.

Parsons (Parsons Engineering Science, Inc.) 2001. *Final Focused Site Investigation Report, Hammond Depot, Hammond, Indiana*, prepared for the U.S. Army Corps of Engineers Huntsville Center, Westmont, Ill., Feb.

Sheets, B. and J. Williams 2001. *Hurricane Watch: Forecasting the Deadliest Storms on Earth*, Vintage Books, New York.

Shott, G.J. et al. 1998. *Performance Assessment for the Area 5 Radioactive Waste Management Site at the Nevada Test Site, Nye County, Nevada*, DOE/NV/11718-176, rev. 2.1, DOE-Nevada Operations Office, Las Vegas, Nev.

Whetsell, Robert, and Jennifer Eberlin 2000. *Cultural Resources Assessment for the Defense Logistics Agency Defense National Stockpile Center Curtis Bay, Anne Arundel County, Maryland,* prepared for the Defense Logistics Agency and the Maryland State Historic Preservation Office by the U.S. Department of Agriculture, U.S. Forest Service. Feb.

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4. CONCLUSIONS

The proposed action would result in no significant adverse impacts—including cumulative impacts—related to land use; ecological resources, including threatened and endangered species; water resources; waste disposal; socioeconomics; human health and safety; environmental justice; archaeological and historic resources; noise; transportation; and air quality. Transportation accidents were also examined because they have the highest potential for adverse impacts under the proposed action. The proposed action would not be expected to produce significant adverse impacts resulting from accidents. The results of these evaluations indicate that an EIS is not needed; and, therefore, a finding of no significant impact is recommended.

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Transportation issues

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APPENDIX A

ORIGIN AND STORAGE OF THE THORIUM NITRATE

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A.1 MATERIAL ORIGIN

Curtis Bay Depot stores thorium nitrate that was produced in the United States, France, and India. The entire stockpile at Hammond Depot was produced in the United States. The domestic inventories at Curtis Bay Depot were produced by the Lindsay Chemical Company for the U.S. Atomic Energy Commission (AEC) (Chung 1997). The material originated from monazite sand concentrates procured by the AEC from the Union of South Africa during 1957–1960. The material was transferred to the National Defense Stockpile between 1959 and 1962, and was relocated to Curtis Bay Depot (Smith 1981). The stockpile at Hammond Depot was produced by the American Potash and Chemical Corporation for the AEC (Chung 1997). The Hammond material originated from South African monazite sand concentrates procured by the AEC. Between 1962 and 1964, this material was transferred to the National Defense Stockpile and relocated to Hammond Depot (Smith 1981).

The thorium nitrate produced in France (which is indicated by labels on the drums) was purchased by the International Selling Corporation through the French agency Commissariat B l'Energie Atomique (Smith 1981). The thorium nitrate produced in India (indicated by labels on the drums) was obtained through a U.S. government purchaser, the Commodity Credit Corporation, on a barter contract in exchange for wheat. The producer was Indian Rare Earths, Ltd.; the supplier was the State Trading Corporation of India; and the contractor was Phillip Brothers, India, Ltd. (Smith 1981).

A.2 CURTIS BAY STOCKPILE

The current stockpile at Curtis Bay Depot is comprised of nearly 5.2 million lb (~ 2.4 million kg) of thorium nitrate in over 19,000 containers—64.1 wt % of the stockpile is of domestic origin, 26.6 wt % was produced in France, and 9.3 wt % was produced in India. Drum configurations at Curtis Bay are designated MD-1 through MD-5

Domestically produced thorium nitrate is stored in Buildings B-911, B-912, and B-913. Most are 30-gallon (0.11 m^3) drums; a few are 55 gallon (0.21m^3). Building B-912 also contains a large number of 40-gallon (0.15 m^3) black plastic drums, which serve as overpack containers for fiberboard drums that were damaged when they were inadvertently sprayed with water from a sprinkler system (Singley 2000). Both the 30-gallon (0.11 m^3) and 55-gallon (0.21m^3) drums contain a layer of slaked lime [solid $Ca(OH)_2$ with $CaCO_3$ impurities] in the bottom of the drums.

The drums of thorium nitrate produced in France and India exhibit external rust, but rust has not been found to penetrate them. Most are 55-gallon (0.21m^3) drums, but some have been overpacked in 85-gallon (0.32 m^3) salvage drums (Singley 2000).

The contract, lot, and drum markings are painted on the individual drums. Some of the markings on the French and Indian drums are quite faded. Recent inspections have indicated that all of the 55-gallon (0.21 m^3) non-domestic drums display slight-to-moderate surface rust. A portion of these 55-gallon (0.21 m^3) non-domestic drums have contaminated exterior surfaces and are not believed to meet current Department of Transportation requirements (Milburn 1999). However, the Defense National Stockpile Center's proposed use of cargo containers will permit shipment. While many French drums exhibit significant surface rust, recent inspection reports indicate that the integrity of the steel in those drums is good. The drums containing thorium nitrate of domestic origin are generally in very good condition (Singley 2000).

A.3 HAMMOND STOCKPILE

The current stockpile at the Hammond Depot includes approximately 1.9 million lb (~ 0.86 million kg) of thorium nitrate and comprises approximately 26.8 wt % of the total thorium nitrate stockpile. All the material is stored in 85-gallon (0.32-m^3) drums in a drum configuration designated IN-1. The original containers were 55-gallon (0.21-m^3) drums.

Because of numerous leaking containers, the entire stockpile at Hammond Depot was overpacked in 1979. The overpacking consisted of the insertion of the original 55-gallon (0.21-m^3) drum into a special polyethylene drum liner, which was, in turn, placed within an 85-gallon (0.32-m^3) carbon-steel drum (Hermes, Singley, and Terry 2000).

Following the overpacking project at Hammond Depot, no leaks have been observed on the sides of any of the 85-gallon (0.32-m^3) drums. The innermost polyethylene bags in the original Hammond packages are considered to be similar to those used in the original containers at Curtis Bay (packaged during 1959–1962), which were found to be brittle with no integrity. Deterioration of the bags is probably caused by their oxidizing contents, thorium nitrate. The absence of any leaks since the 1979 overpacking campaign indicates that any oxidation has been stabilized by crushed limestone and the heavy-walled plastic liner.

A.4 REFERENCES

Chung, T. 1997. "The Role of Thorium Nitrate in Nuclear Energy," pp. ix–xvii in *Uranium Industry Annual 1996*, DOE/EIA-0478(96), U.S. Department of Energy, Energy Information Administration, Washington, D.C.

Hermes, W. H., P.T. Singley, and J.W. Terry 2000. *Trip Report to the DLA Hammond, Indiana, Depot on June 8, 2000*, Oak Ridge National Laboratory, Oak Ridge, Tenn., June.

Milburn, J. 1999. "Notification of Stockpile Inspection," DLAH Form 30, containing information for DNSC Curtis Bay Depot, Baltimore, Md., Sept.

Singley, P.T. 2000. *Trip Report to the DLA-HQ at Fort Belvoir and Curtis Bay Storage Depot, May 16–17, 2000*, Oak Ridge National Laboratory, Oak Ridge, Tenn., June.

Smith, C.D. 1981. Office of Stockpile Management, General Services Administration, "Thorium Nitrate at Curtis Bay, Maryland," correspondence to L.H. Kenyon, Seattle, Aug. 28

APPENDIX B

DNSC RADIOACTIVE MATERIALS LICENSE

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION I
475 ALLENDALE ROAD
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

May 5, 2003

Docket No. 04000341 License No. STC-133
Control No. 133076

F. Kevin Reilly
Director, Directorate of Environmental Management
Defense Logistics Agency
Defense National Stockpile Center
8725 John J. Kingman Road, Suite 3229
Ft. Belvoir, VA 22060-6223

SUBJECT: DEFENSE LOGISTICS AGENCY, ISSUANCE OF LICENSE AMENDMENT, CONTROL NO. 133076

Dear Mr. Reilly:

This refers to your license amendment request. Enclosed with this letter is the amended license.

We understand that you are currently remediating facilities at the DNSC New Haven Depot. We understand that you will provide us with copies of the remediation plans and the final status survey plans for this site as soon as possible. In accordance with this amendment, we further understand that you will provide us with copies of remediation plans and final status survey plans for our review and approval prior to implementation at other DLA sites in the future. Because of the nature of you sites, procedures and plans for release of the various sites will be different, therefore our review and approval is needed each time you intend to release sites for unrestricted use.

Please review the enclosed document carefully and be sure that you understand and fully implement all the conditions incorporated into the amended license. If there are any errors or questions, please notify the U.S. Nuclear Regulatory Commission, Region I Office, Licensing Assistance Team, (610) 337-5239, so that we can provide appropriate corrections and answers.

In accordance with 10 CFR 2.790, a copy of this letter will be placed in the NRC Public Document Room and will be accessible from the NRC Web site at http://www.nrc.gov/reading-rm.html.

F. Reilly
Defense Logistics Agency

2

Thank you for your cooperation.

Sincerely,

Betsy Ullrich
Senior Health Physicist
Nuclear Materials Safety Branch 2
Division of Nuclear Materials Safety

Enclosure:
Amendment No. 24

APR 14 2003

DNSC-E

U.S. Nuclear Regulatory Commission
Region 1, Nuclear Materials Safety Branch
Division of Nuclear Materials Safety
ATTN: Ms Betsy Ullrich
475 Allendale Road
King of Prussia, PA 19406-1415

Dear Ms Ullrich:

Re: License STC-133

SUBJECT: Amendment to Source Materials License

The Defense National Stockpile Center (DNSC) requests an amendment to the subject license which would permit us to conduct site cleanup activities at potentially contaminated locations, where it stores licensed material, in order to release the sites for unrestricted use.

The DNSC will submit all remediation plans to the Nuclear Regulatory Commission (NRC) for review prior to undertaking site cleanup activities.

Additionally, the DNSC will submit all plans and designs for final status surveys to the NRC for review prior to implementation. Surveys will be accomplished in accordance with NUREG-1575, the Multi-Agency Radiation Survey and Site Investigation Manual.

Sincerely,
F. KEVIN REILLY
Director,
Directorate of Environmental Management Division

F. KEVIN REILLY
Director,
Directorate of Environmental
Management

cc: Off. file

MPECULLAN:mjp:767-7620:4/14/03

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Amendment No. 24

MATERIALS LICENSE

Pursuant to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974 (Public Law 93-438), and Title 10, Code of Federal Regulations, Chapter I, Parts 30, 31, 32, 33, 34, 35, 36, 39, 40 and 70, and in reliance on statements and representations heretofore made by the licensee, a license is hereby issued authorizing the licensee to receive, acquire, possess, and transfer byproduct, source, and special nuclear material designated below; to use such material for the purpose(s) and at the place(s) designated below; to deliver or transfer such material to persons authorized to receive it in accordance with the regulations of the applicable Part(s). This license shall be deemed to contain the conditions specified in Section 183 of the Atomic Energy Act of 1954, as amended, and is subject to all applicable rules, regulations, and orders of the Nuclear Regulatory Commission now or hereafter in effect and to any conditions specified below.

Licensee	
1. Defense Logistics Agency Defense National Stockpile Center	In accordance with the letter dated April 14, 2003, 3. License number STC-133 is amended in its entirety to read as follows:
2. 8725 John J. Kingman Road Suite 4716 Fort Belvoir, Virginia 22060-6223	4. Expiration date February 28, 2010 5. Docket No. 040-00341 Reference No.

6. Byproduct, source, and/or special nuclear material	7. Chemical and/or physical form	8. Maximum amount that licensee may possess at any one time under this license
A. Uranium and Thorium	A. Natural uranium and thorium mixtures as ores, concentrates and solids	A. 2,000,000 kilograms

9. Authorized use:

A. Storage, sampling, repackaging and transfer as necessary for the activities of the National Defense Stockpile.

CONDITIONS

10. Licensed material shall be used only at the licensee's facilities located at DNSC Hammond Depot, 3200 Sheffield Avenue, Hammond, Indiana; DNSC New Haven Depot, State Route 14, New Haven, Indiana; DNSC Curtis Bay Depot, 710 Ordnance Road, Baltimore, Maryland; DNSC Somerville Depot, 152 US Highway Route 206 South, Somerville, New Jersey; DNSC Binghamton Depot, Hoyt Avenue, Binghamton, New York; and DNSC Scotia Depot, Route 5, Scotia, New York.

11. A. Licensed material shall be used by, or under the supervision of, F. Kevin Reilly, Michael J. Pecullan or individuals who have completed the training described in the application dated September 10, 1999, and the letter dated January 7, 2000.

    B. The Radiation Safety Officer for this license is F. Kevin Reilly.

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MATERIALS LICENSE
SUPPLEMENTARY SHEET

License Number	STC-133
Docket or Reference Number	040-00341
Amendment No. 23	

12. The licensee is authorized to transport licensed material in accordance with the provisions of 10 CFR Part 71, "Packaging and Transportation of Radioactive Material."

13 Except as specifically provided otherwise in this license, the licensee shall conduct its program in accordance with the statements, representations, and procedures contained in the documents, including any enclosures, listed below. The Nuclear Regulatory Commission's regulations shall govern unless the statements, representations, and procedures in the licensee's application and correspondence are more restrictive than the regulations.

A. Letter dated November 3, 1998
B. Letter and application dated September 10, 1999
C. Letter dated January 7, 2000 (Lepage)
D. Letter dated January 7, 2000 (Reilly)
E. Letter dated April 14, 2003

For the U.S. Nuclear Regulatory Commission

Date May 5, 2003

By Elizabeth Ullrich
Elizabeth Ullrich
Nuclear Materials Safety Branch 2
Division of Nuclear Materials Safety
Region I
King of Prussia, Pennsylvania 19406

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APPENDIX C

REPRESENTATIVE LIST OF REGULATIONS RELEVANT TO THORIUM NITRATE STOCKPILE DISPOSAL

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C.1 LAWS, REGULATIONS, AND EXECUTIVE ORDERS

The major federal laws, Executive Orders, Department of Defense (DoD), and Defense Logistics Agency (DLA) directives, instructions, and manuals and other compliance requirements that may apply to thorium nitrate disposal activities are identified in Table C-1. These compliance requirements are briefly described in Sections C.1.1–C.1.8. Federal regulations that implement statutes and Executive Orders are identified and discussed in these sections where applicable.[1]

There are a number of federal environmental statutes dealing with protection, compliance, or consultation that affect actions at the Curtis Bay Depot, the Hammond Depot, and the Nevada Test Site. In addition, certain environmental requirements have been delegated to state authorities for enforcement and implementation. Although this appendix does not list specific state requirements in Table C-1, state-administered programs are discussed throughout the appendix where applicable. It is DNSC policy to conduct operations in an environmentally safe manner in compliance with all applicable federal, state, and local statutes, regulations, and standards. Although this appendix does not address pending legislation or future regulations, DNSC recognizes that the regulatory environment is subject to many changes, and that the transportation and disposal of thorium nitrate must be conducted in compliance with the regulations and standards applicable at the time the action is taken.

This appendix presents the laws, regulations, and other requirements that apply to the proposed action and alternatives. No new legislation or exemptions or waivers from any existing regulatory requirements would be required to implement any of the alternatives presented in Section 2 of this environmental assessment. The proposed action would be implemented in a manner that complies with DoD, DLA, DNSC, and other federal environmental, safety, and health laws, regulations, Executive Orders, and environmental permitting requirements. Informal consultations are being undertaken with appropriate federal and state agencies as part of the National Environmental Policy Act process.

C.1.1 Air Quality and Noise

Clean Air Act of 1970, as amended (42 U.S.C. 7401 et seq.) The Clean Air Act is intended to "protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare and the productive capacity of its population." Section 118 of the Clean Air Act (42 U.S.C. 7418) requires that each Federal agency with jurisdiction over any property or facility engaged in any activity that might result in the discharge of air pollutants comply with "all Federal, state, interstate, and local requirements" with regard to the control and abatement of air pollution. The Clean Air Act requires: (1) the U.S. Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards as necessary to protect the public health, with an adequate margin of safety, from any known or anticipated adverse effects of a regulated pollutant (42 U.S.C. 7409 et seq.); (2) establishment of national standards of performance for new

[1] A number of these documents are available on the World Wide Web.
Executive Orders: http://www.archives.gov/federal_register/executive_orders/disposition_tables.htm
DoD directives, instructions, and manuals: http://www.dtic.mil/whs/directives
DLA directives, instructions, and manuals: http://www.dlaps.hq.dla.mil/SR2B.htm
U.S. Code of Federal Regulations: http://www.access.gpo.gov/nara/cfr/index.html
DLA regulations: http://www.dlaps.hq.dla.mil/SR2B.htm

Table C-1. Federal environmental statutes, Executive Orders, and guidance[a]

Statutes, Executive Orders, guidance citations

Air quality and noise
- Clean Air Act of 1970 (42 U.S.C. 7401 et seq.)
- Noise Control Act of 1972 (42 U.S.C. 4901 et seq.)

Water resources
- Clean Water Act (33 U.S.C. 1251 et seq.)
- Safe Drinking Water Act of 1974 (42 U.S.C. 300f et seq.)
- Protection of Wetlands (EO 11990, May 25, 1977))

Waste management, pollution prevention, and conservation
- Solid Waste Disposal Act of 1965, as amended by the Resource Conservation and Recovery Act of 1976 and the Hazardous and Solid Waste Amendments of 1984 (42 U.S.C. 6901 et seq.)
- Pollution Prevention Act of 1990 (42 U.S.C. 13101 et seq.)
- Federal Compliance with Pollution Control Standards, as amended by EO 12580 (EO 12088, October 17, 1978). Sections 1–4, "Pollution Control Plan," were revoked by EO 13148, April 26, 2000 (see 65 FR 24595).
- Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition (EO 13101, September 14, 1998)
- Pollution Prevention (DoDI 4715.4)
- Hazardous Material Pollution Prevention (DLAD 4210.4)
- Defense Logistics Agency Environmental Protection Manual (DLAM 6050.1)
- Radioactive Waste Management (DOE Order 435.1)

Biotic resources
- Fish and Wildlife Coordination Act of 1958 (16 U.S.C. 661 et seq.)
- Bald and Golden Eagle Protection Act of 1972 (16 U.S.C. 668 to 668d)
- Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.)
- Natural Resources Management Program (DoDD 4700.4)

Environmental regulations, permits, and consultations

Cultural Resources
- American Antiquities Act of 1906 (16 U.S.C. 431 et seq.)
- National Historic Preservation Act of 1966 (16 U.S.C. 470 et seq.)
- Archaeological and Historical Preservation Act of 1974 (16 U.S.C. 469 to 469c)
- Protection and Enhancement of Cultural Environment (EO 11593, May 13, 1971)
- Archaeological and Historic Resources Management (DoDD 4710.1)
- Measures of Merit (DoDI 4715.3)

Worker Safety and Health
- Occupational Safety and Health Act of 1970 (29 U.S.C. 651 et seq.)
- Safety and Occupational Health Policy for the Department of Defense (DoDD 1000.3)

Table C-1. *(continued)*

Worker Health and Safety *(continued)*
- Occupational Radiation Protection (10 CFR §835)
- Notices, Instructions, and Reports to Workers: Inspection and Investigation (10 CFR §19)
- Standards for Protection Against Radiation (10 CFR §20)
- Nuclear Safety Management (10 CFR §830, Subpart A)
- Recording and Reporting Occupational Injuries and Illness (29 CFR §1904)
- Safety Management System Policy (DOE Policy 450.4)

Transportation
- Packaging and Transportation of Radioactive Material (10 CFR §71)
- Hazardous Materials Transportation Act of 1975 (49 U.S.C. 5105 et seq.)
- Transportation and Traffic Management (DoDD 4500.9)
- Packaging and Transportation Safety (DOE Order 460.1B)
- Packaging of Hazardous Material (DLAD 4145.41)
- Defense Logistics Agency Transportation and Traffic Management (DLAD 4500.14)

Other
- Reporting of Defects and Non Compliance (10 CFR §21)
- Domestic Licensing of Source Material (10 CFR §40)
- Fees for Facilities, Materials, Import and Export Licenses and Other Regulatory NRC Information (10 CFR §170)
- Incomplete or Inaccurate Information (NRC Information Notice 2002-36)
- General Policy and Procedure for NRC Enforcement Actions (NUREG-1600)
- Strategic and Critical Materials Stock Piling Act (50 U.S.C. 98 et seq.)
- National Environmental Policy Act of 1969 (42 U.S.C. 4321 et seq.)
- Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.)
- Protection and Enhancement of Environmental Quality, as amended by EO 11991 (EO 11514, March 5, 1970)
- Federal Actions to Address Environmental Justice in Minority and Low-Income Populations (EO 12898, February 11, 1994)
- Protection of Children from Environmental Health Risks and Safety Risks (EO 13045, April 27, 1997)
- Trade Security Controls on Department of Defense Excess and Surplus Personal Property (DoDD 2030.8)
- Environmental Security (DoDD 4715.1)
- Environmental Compliance (DoDI 4715.6)
- Procedural Rules for DOE Nuclear Activities (10 CFR §820)
- Defense National Stockpile Operations Manual (DNSCM 4145.1)

[a]Abbreviations used: DLAD = DLA Directive; DLAM = DLA Manual; DNSCM = DNSC Manual; DoDD = DoD Directive; DoDI = DoD Instructions; EO = Executive Order; U.S.C. = U.S. Code.

or modified stationary sources of atmospheric pollutants (42 U.S.C. 7411); (3) specific emission increases to be evaluated so as to prevent a significant deterioration in air quality (42 U.S.C. 7470 et seq.); and (4) specific standards for releases of hazardous air pollutants (42 U.S.C. 7412). These standards are implemented through state implementation plans developed by each state with EPA approval. The Clean Air Act requires sources to meet standards and obtain permits to satisfy these standards. Emissions of air pollutants are regulated by EPA under Title 40 of the Code of Federal Regulations (CFR) Parts 50 through 99. No amendments to current air permits or applications for new permits are expected for any alternatives.

Noise Control Act of 1972, as amended (42 U.S.C. 4901 et seq.) Section 4 of the Noise Control Act of 1972, as amended, directs all Federal agencies to carry out "to the fullest extent within their authority" programs within their jurisdictions in a manner that furthers a national policy of promoting an environment free from noise jeopardizing health and welfare. All alternatives would require compliance with this act.

C.1.2 Water Resources

Clean Water Act of 1972, as amended (33 U.S.C. 1251 et seq.) The Clean Water Act, which amended the Federal Water Pollution Control Act, was enacted to "restore and maintain the chemical, physical, and biological integrity of the Nation's water." The Clean Water Act prohibits the discharge of toxic pollutants in toxic amounts to navigable waters of the United States. Section 13 of the Clean Water Act requires all branches of the Federal Government engaged in any activity that might result in a discharge or runoff of pollutants to surface waters to comply with Federal, state, interstate, and local requirements. States are responsible for establishing, reviewing, and revising water quality standards pursuant to Section 303 and for submitting them to the EPA Administrator for review and concurrence. Water quality standards consider the designated uses of the navigable waters involved and the water quality criteria for such waters are based on the designated uses. Whenever a state revises or adopts a new standard, the state must also adopt criteria for all toxic pollutants listed pursuant to Section 307(a)(1) of the Clean Water Act (40 CFR §131). The Clean Water Act also provides guidelines and limitations for effluent discharges from point-source discharges and establishes the National Pollutant Discharge Elimination System (NPDES) permit program, which is administered by EPA, pursuant to regulations in 40 CFR §122 et seq., and may be delegated to states. Sections 401 through 405 of the Water Quality Act of 1987 added Section 402(p) to the Clean Water Act requiring that EPA establish regulations for permits for storm water discharges associated with industrial activities. Storm water provisions of the NPDES program are set forth at 40 CFR §Section 122.26. Permit modifications are required if discharge effluent is altered. No amendments to current NPDES permits or applications for new permits are expected for any of the alternatives.

Safe Drinking Water Act of 1974, as amended (42 U.S.C. 300(f) et seq.) The primary objective of the Safe Drinking Water Act is to protect the quality of public drinking water supplies and sources of drinking water. The implementing regulations, administered by EPA unless delegated to states, establish standards applicable to public water systems. These regulations include maximum contaminant levels in public water systems, which are defined as water systems that have at least 15 service connections used by year-round residents or regularly serve at least 25 year-round residents. The EPA regulations implementing the Safe Drinking Water Act are found under 40 CFR §100 through 149. Other programs established by the Safe Drinking Water Act include the Sole Source Aquifer Program, the Wellhead Protection Program, and the Underground Injection Control Program. Activities conducted under all of the alternatives must be in compliance with the standards specified under the Safe Drinking Water Act.

Protection of Wetlands (Executive Order 11990) This order requires Federal agencies to avoid any short- or long-term adverse impacts on wetlands wherever there is a practicable alternative. Each agency must also provide opportunity for early public review of any plans or proposals for new construction in wetlands.

C.1.3 Waste Management, Pollution Prevention, and Conservation

Solid Waste Disposal Act of 1965, as amended by the Resource Conservation and Recovery Act of 1976 and the Hazardous and Solid Waste Amendments of 1984 (42 U.S.C. 6901 et seq.) The Solid Waste Disposal Act of 1965, as amended, governs the transportation, treatment, storage, and disposal of hazardous and nonhazardous waste. Under the Resource Conservation and Recovery Act of 1976 (RCRA), which amended the Solid Waste Disposal Act of 1965, EPA defines and identifies hazardous waste; establishes standards for its transportation, treatment, storage, and disposal; and requires permits for persons engaged in hazardous waste activities. Section 3006 of the act (42 U.S.C. 6926) allows states to establish and administer these permit programs with EPA approval. EPA regulations implementing RCRA are found in 40 CFR §260 through 283. The Waste Management section of Chap. 3, Environmental Consequences, provides information on the generation and management of hazardous wastes for each of the alternatives.

Pollution Prevention Act of 1990 (42 U.S.C. 13101 et seq.) The Pollution Prevention Act establishes a national policy for waste management and pollution control. Source reduction is given first preference, followed by environmentally safe recycling, with disposal or releases to the environment as a last resort. Activities under all of the alternatives would need to be in compliance with the Pollution Prevention Act and implementing regulations.

Federal Compliance with Pollution Control Standards (Executive Order 12088), as amended by Executive Order 12580, Federal Compliance with Pollution Control Standards, January 23, 1987 This order directs Federal agencies to comply with applicable administrative and procedural pollution control standards established by, but not limited to, the Clean Air Act, the Noise Control Act, the Clean Water Act, the Safe Drinking Water Act, the Toxic Substances Control Act, and RCRA.

Greening the Government Through Waste Prevention, Recycling, and Federal Acquisition (Executive Order 13101) This order requires each Federal agency to incorporate waste prevention and recycling in its daily operations and work to increase and expand markets for recovered materials. This order states that it is national policy to prefer pollution prevention, whenever feasible. Pollution that cannot be prevented should be recycled; pollution that cannot be prevented or recycled should be treated in an environmentally safe manner. Disposal should be employed only as a last resort.

Pollution Prevention (DoDI 4715.4) This instruction implements policy, assigns responsibility, and prescribes procedures for implementing pollution prevention programs throughout DoD. This instruction also authorizes the publication of the "Guide for Qualified Recycling Programs."

Hazardous Material Pollution Prevention (DLAD 4210.4) This directive establishes the DLA Comprehensive Hazardous Material Management Program and the Hazardous Material Minimization Program, which includes DLA's source reduction program directed through the management of product/process specifications and standards documents/programs. This directive further establishes the Hazardous Material Management Council as the vehicle to address and resolve issues in hazardous material logistics management.

DLA Environmental Protection Manual (DLAM 6050.1) This manual summarizes and highlights regulatory requirements that are of primary concern to DLA activities and provides compliance guidance and direction. The manual serves as DLA implementation of Executive Order 12088, Federal Compliance with Pollution Control Standards. It also identifies requirements, policies, and procedures for (1) preventing, controlling and responding to spills of oils and hazardous substances; (2) the protection of drinking water quality at DLA installations; (3) the permitting and control of wastewater discharges at DLA installations; (4) the control of air pollution; (5) hazardous waste management; (6) resource recovery and recycling; (7) polychlorinated biphenyls management; and (8) the defense environmental restoration program. Instructions on the preparation and submission of the Federal Agency Pollution Abatement Project Report are also provided in the manual.

Radioactive Waste Management (DOE Order 435.1). The objective of this DOE Order is to ensure that all DOE radioactive waste is managed in a manner that protects worker and public health and safety, and the environment. The order applies to the management of

1. all high-level waste, transuranic waste, and low-level waste, including the radioactive component of mixed waste, for which DOE is responsible;
2. DOE accelerator-produced radioactive waste; and
3. if managed at DOE low-level waste facilities, byproduct materials as defined by section 11e.(2) of the Atomic Energy Act of 1954, as amended, or naturally occurring radioactive materials.

C.1.4 Biotic Resources

Fish and Wildlife Coordination Act of 1958 (16 U.S.C. 661 et seq.) The Fish and Wildlife Coordination Act promotes more effective planning and cooperation between Federal, state, public, and private agencies for the conservation and rehabilitation of the Nation's fish and wildlife and authorizes the U.S. Department of the Interior to provide assistance. This act requires, among other things, consultation with the U.S. Fish and Wildlife Service on the possible effects on wildlife if there is construction, modification, or control of bodies of water in excess of 10 acres (4 ha) in surface area.

Bald and Golden Eagle Protection Act of 1972, as amended (16 U.S.C. 668 through 668d) The Bald and Golden Eagle Protection Act, as amended, makes it unlawful to take, pursue, molest, or disturb bald (American) and golden eagles, their nests, or their eggs anywhere in the United States (Section 668, 668c). A permit must be obtained from the U.S. Department of the Interior to relocate a nest that interferes with resource development or recovery operations.

Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) The act is intended to prevent the further decline of endangered and threatened species and to restore these species and habitats. Section 7 of the act requires Federal agencies having reason to believe that a prospective action may affect an endangered or threatened species or its habitat to consult with the U.S. Fish and Wildlife Service of the U.S. Department of the Interior or the National Marine Fisheries Service of the U.S. Department of Commerce to ensure that the action does not jeopardize the species or destroy its habitat (50 CFR §17). If, despite reasonable and prudent measures to avoid or minimize such impacts, the species or its habitat would be jeopardized by the action, a review process is specified to determine whether the action may proceed.

Natural Resources Management Program (DoDD 4700.4) This directive prescribes policies and procedures for an integrated program for multiple-use management of natural resources on property under DoD control. This directive states that DoD will act responsibly in the public interest in managing its lands and natural resources and will have a conscious and active concern for the inherent value of natural resources in all DoD plans, actions, and programs.

C.1.5 Cultural Resources

American Antiquities Act of 1906, as amended (16 U.S.C. 431 to 433) This act protects historic and prehistoric ruins, monuments, and antiquities, including paleontological resources, on federally controlled lands from appropriation, excavation, injury, and destruction without permission. Under this act, the President of the United States is authorized to declare historic landmarks, prehistoric and historic structures, and other objects of historic or scientific interest situated on lands controlled or owned by the Federal Government to be national monuments.

National Historic Preservation Act of 1996, as amended (16 U.S.C. 470 et seq.) The National Historic Preservation Act provides that sites with significant national historic value be placed on the National Register of Historic Places, which is maintained by the Secretary of the Interior. The major provisions of the act for DLA are Sections 106 and 110. Both sections aim to ensure that historic properties are appropriately considered in planning Federal initiatives and actions. Section 106 is a specific, issue-related mandate to which Federal agencies must adhere. It is a reactive mechanism that is driven by a Federal action. Section 110, in contrast, sets out broad Federal agency responsibilities with respect to historic properties. It is a proactive mechanism with emphasis on ongoing management of historic preservation sites and activities at Federal facilities. No permits or certifications are required under the act. Section 106 requires the head of any Federal agency having direct or indirect jurisdiction over a proposed Federal or federally assisted undertaking to ensure compliance with the provisions of the act. It compels Federal agencies to "take into account" the effect of their projects on historical and archaeological resources and to give the Advisory Council on Historic Preservation the opportunity to comment on such effects. Section 106 mandates consultation during Federal actions if the undertaking has the potential to have an effect on a historic property. This consultation normally involves the State Historic Preservation Officer and may include other organizations and individuals, such as local governments and Native American tribes. If an adverse effect is found, the consultation often ends with the execution of a memorandum of agreement that states how the adverse effects will be resolved. The regulations implementing Section 106, found in 30 CFR §800, were revised on May 18, 1999 (64 FR 27043), effective June 17, 1999. This revision introduced new flexibility and options for agencies to use to meet their obligations to comply with the act.

Archaeological and Historic Preservation Act of 1974, as amended (16 U.S.C. 469 to 469c) This act protects sites that have prehistoric and historic importance. It provides for the preservation of historical and archeological data, including relics and specimens, which might otherwise be irreplaceably lost as a result of any Federal construction project or federally licensed activity or program. The management of any future findings of prehistoric or historic resources during archaeological surveys or other activities would be required to comply with this act.

Protection and Enhancement of the Cultural Environment (Executive Order 11593) This order directs Federal agencies to locate, inventory, and nominate properties under their jurisdiction or control to the National Register of Historic Places, if those properties qualify. This process requires DLA to provide the Advisory Council on Historic Preservation the opportunity to comment on the possible impacts of the proposed activity on any potential eligible or listed resources. (See the *National Historic Preservation Act of 1996, as amended.*)

Archaeological and Historic Resources Management (DoDD 4710.1) This directive prescribes procedures and assigns responsibilities for the management of archaeological and historic resources located on lands under DoD control. This directive states that it is DoD policy to integrate the archaeological and historic preservation requirements of applicable laws with the planning and management of activities under DoD control, to minimize expenditures through judicious application of options available in complying with applicable laws, and to encourage practical, economically feasible rehabilitation and adaptive use of significant historical resources.

Measures of Merit DoDI 4715.3 This instruction contains cultural resources management requirements for all DoD installations.

C.1.6 Worker Safety and Health

Occupational Safety and Health Act of 1970 (29 U.S.C. 651 et seq.) The Occupational Safety and Health Act establishes standards for safe and healthful working conditions in places of employment throughout the United States. The act is administered and enforced by the Occupational Safety and Health Administration (OSHA), a U.S. Department of Labor agency. Although OSHA and EPA both have a mandate to reduce exposures to toxic substances, OSHA's jurisdiction is limited to safety and health conditions that exist in the workplace environment. Under the act, it is the duty of each employer to furnish employees a place of employment free of recognized hazards likely to cause death or serious physical harm. Employees have a duty to comply with the occupational safety and health standards and rules, regulations, and orders issued under the act. OSHA regulations (29 CFR §1910) establish specific standards telling employers what must be done to achieve a safe and healthful working environment. Government agencies, including DLA, are not technically subject to OSHA regulations, but are required under 29 U.S.C. 668 to establish their own occupational safety and health programs for their places of employment that are consistent with OSHA standards. Activities under all the alternatives would need to be conducted in compliance with this act.

Safety and Occupational Health Policy for the Department of Defense (DoDD 1000.3) This directive requires DoD to implement comprehensive programs to protect DoD personnel from accidental death, injury, or occupational illness and the public from death, injury, and illness, or property damage as a result of DoD operations.

Occupational Radiation Protection (10 CFR §835). These regulations establish radiation protection standards, limits, and program requirements for protecting individuals from ionizing radiation resulting from the conduct of DOE activities.

Notices, Instructions, and Reports to Workers: Inspection and Investigation (10 CFR §19). These regulations establish requirements for notices, instructions, and reports by licensees to individuals participating in licensed activities and options available to these individuals in connection with Commission inspections of licensees to ascertain compliance with the provisions of the Atomic Energy Act of 1954, as amended, Title II of the Energy Reorganization Act of 1974, and regulations, orders, and licenses thereunder regarding radiological working conditions.

Standards for Protection Against Radiation (10 CFR §20). These regulations establish standards for protection against ionizing radiation resulting from activities conducted under licenses issued by the Nuclear Regulatory Commission. The purpose of the regulations is to control the receipt, possession, use, transfer, and disposal of licensed material by any licensee in such a manner that the total dose to an individual (including doses resulting from licensed and unlicensed radioactive material and from radiation sources other than background radiation) does not exceed the standards for protection against radiation prescribed in the regulations in this part.

Recording and Reporting Occupational Injuries and Illness (29 CFR §1904). Under OSHA regulations, companies of the size and type associated with the proposed action must record and report OSHA injury and illness statistics.

Nuclear Safety Management (10 CFR §830 Subpart A). This part governs the conduct of DOE contractors, DOE personnel, and other persons conducting activities (including providing items and services) that affect, or may affect, the safety of DOE nuclear facilities. Subpart A establishes quality assurance requirements for contractors conducting activities, including providing items or services, that affect, or may affect, nuclear safety of DOE nuclear facilities.

Safety Management System Policy (DOE Policy 450.4). The DOE safety management system establishes a hierarchy of components to facilitate the orderly development and implementation of safety management throughout the DOE complex. The safety management system consists of six components: (1) the objective, (2) guiding principles, (3) core functions, (4) mechanisms, (5) responsibilities, and (6) implementation. The objective, guiding principles, and core functions of safety management are intended to be used consistently in implementing safety management throughout the DOE complex. The mechanisms, responsibilities, and implementation components are established for all work and will vary based on the nature and hazard of the work being performed.

C.1.7 Transportation

Packaging and Transportation of Radioactive Material (10 CFR §71). This part establishes the (1) requirements for packaging, preparation for shipment, and transportation of licensed material and (2) procedures and standards for NRC approval of packaging and shipping procedures for fissile material and for a quantity of other licensed material in excess of a Type A quantity. The packaging and transport of licensed material are also subject to other parts of this chapter (e.g., 10 CFR §parts 20, 21, 30, 40, 70, and 73) and to the regulations of other agencies (e.g., the U.S. Department of Transportation) having jurisdiction over means of transport. The requirements of this part are in addition to, and not in substitution for, other requirements. The regulations in this part apply to any licensee authorized by specific or general license issued by the Commission to receive, possess, use, or transfer licensed material, if the licensee delivers that material to a carrier for transport, transports the material outside the site of usage as specified in the NRC license, or transports that material on public highways. The transport of licensed material or delivery of licensed material to a carrier for transport is subject to the operating controls and procedures requirements of subpart G of this part, to the quality assurance requirements of subpart H of this part, and to the general provisions of subpart A of this part, including DOT regulations referenced in Section 71.5.

Hazardous Materials Transportation Act of 1975 (49 U.S.C. 5105 et seq.) Transportation of hazardous materials and substances is regulated by the U.S. Department of Transportation (DOT). The Hazardous Material Transportation Act of 1975 requires DOT to prescribe uniform national regulations for transportation of hazardous materials. Most state and local regulations regarding such transportation that are not substantively the same as DOT regulations are preempted (i.e., rendered void) (49 U.S.C. 5125). This, in effect, allows state and local governments to only enforce the Federal regulations, not to change or expand upon them. This program is administered by the Research and Special Programs Administration of DOT, which coordinates its regulations with those of EPA (under RCRA) when covering the same activities. DOT regulations (49 CFR §171 through 178, and 49 CFR §383 through 397) contain requirements for identifying a material as hazardous. DOT hazardous material regulations establish standards for packaging, marking and labeling, placarding, monitoring, routes, accident reporting and manifesting. Requirements for transport by rail, air, and public highway are included. All alternatives requiring the transportation of thorium nitrate would need to be in compliance with these regulations.

Transportation and Traffic Management (DoD 4500.9) This directive prescribes general DoD transportation and traffic management policies. This directive requires that DoD transportation resources be organized and managed to ensure optimum responsiveness, efficiency, and economy to support the DoD mission.

Packaging and Transportation Safety (DOE Order 460.1B). This order establishes safety requirements for the proper packaging and transportation of DOE/NNSA offsite shipments and onsite transfers of hazardous materials and for modal transport. (Offsite is any area within or outside a DOE site to which the public has free and uncontrolled access; onsite is any area within the boundaries of a DOE site or facility to which access is controlled.)

Packaging of Hazardous Material (DLAD 4145.41) This directive establishes uniform policy for the Military Services and DLA for packaging hazardous materials for safe, efficient, and legal storage, handling, and transportation.

DLA Transportation and Traffic Management (DLAD 4500.14) This directive establishes transportation and traffic management policy, assigns responsibilities, and provides guidance; it is applicable to all modes of transportation.

C.1.8 Other Statutes, Executives Orders, and Guidance

Reporting of Defects and Non Compliance (10 CFR §21). These regulations establish procedures and requirements for implementation of section 206 of the Energy Reorganization Act of 1974. That section requires any individual director or responsible officer of a firm constructing, owning, operating or supplying the components of any facility or activity which is licensed or otherwise regulated pursuant to the Atomic Energy Act of 1954, as amended, or the Energy Reorganization Act of 1974, who obtains information reasonably indicating (a) that the facility, activity or basic component supplied to such facility or activity fails to comply with the Atomic Energy Act of 1954, as amended, or any applicable rule, regulation, order, or license of the Commission relating to substantial safety hazards or (b) that the facility, activity, or basic component supplied to such facility or activity contains defects, which could create a substantial safety hazard, to immediately notify the Commission of such failure to comply or such defect, unless he has actual knowledge that the Commission has been adequately informed of such defect or failure to comply.

Domestic Licensing of Source Material (10 CFR §40). These regulations establish procedures and criteria for the issuance of licenses to receive title to, receive, possess, use, transfer, or deliver source and byproduct materials, as defined in this part, and establish and provide for the terms and conditions upon which the Commission will issue such licenses. The regulations also provide for the disposal of byproduct material and for the long-term care and custody of byproduct material and residual radioactive material.

Fees for Facilities, Materials, Import and Export Licenses and Other Regulatory NRC Information (10 CFR §170). These regulations set out fees charged for licensing services rendered by the Nuclear Regulatory Commission as authorized under title V of the Independent Offices Appropriation Act of 1952 (65 Stat. 290; 31 U.S.C. 483a) and provisions regarding their payment.

Incomplete or Inaccurate Information (NRC Information Notice 2002-36). The NRC issued this Information Notice (IN) to remind addressees of the importance of diligently ascertaining the accuracy of educational background and professional qualifications of any contractor or subcontractor employees subject to such qualification requirements. Th IN also alerts addressees of the potential penalties that could result from intentionally providing incomplete or inaccurate information to NRC. It is expected that recipients will review this information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems.

General Policy and Procedure for NRC Enforcement Actions (NUREG-1600). The Commission has developed an enforcement program and enforcement policy to support the NRC's overall safety mission in protecting the public and the environment. Consistent with that purpose, enforcement action is used as a deterrent to emphasize the importance of compliance with regulatory requirements, and to encourage prompt identification and prompt, comprehensive correction of violations. Consistent with the primary purpose of supporting the NRC's overall safety mission in protecting the public health and safety, the policy endeavors to deter noncompliance by emphasizing the importance of compliance with NRC requirements and encourage prompt identification and prompt, comprehensive correction of violations of NRC requirements. Therefore, licensees, contractors, and their employees who do not achieve the high standard of compliance which the NRC expects will be subject to enforcement sanctions. Each enforcement action is dependent on the circumstances of the case. However, in no case will licensees who cannot achieve and maintain adequate levels of safety be permitted to continue to conduct licensed activities.

Violations are identified through inspections and investigations. All violations are subject to civil enforcement action and may also be subject to criminal prosecution. After an apparent violation is identified, it is assessed in accordance with the Commission's Enforcement Policy (NUREG-1600). Because it is a policy statement and not a regulation, the Commission may deviate from this statement of policy and procedure as appropriate under the circumstances of a particular case.

There are three primary enforcement sanctions available: Notices of Violation, civil penalties, and orders. A Notice of Violation (NOV) identifies a requirement and how it was violated, and formalizes a violation pursuant to 10 CFR §2.201. A civil penalty is a monetary fine issued under authority of Section 234 of the Atomic Energy Act (AEA) or Section 206 of the Energy Reorganization Act (ERA). Section 234 of the AEA provides for penalties of up to $100,000 per violation per day; but that amount has been adjusted by the Debt Collection Improvement Act of 1996 to be $120,000. The Commission's order issuing authority under Section 161 of the AEA is broad and extends to any area of licensed activity that affects the public health and safety. Orders modify, suspend, or revoke licenses or require specific actions by licensees or persons. NOVs and civil penalties are issued based on violations. Orders may be issued for violations, or in the absence of a violation, because of a public health or safety issue.

Strategic and Critical Materials Stock Piling Act (50 U.S.C. 98 et seq.) The Strategic and Critical Materials Stock Piling Act regulates DLA disposal of material from the National Defense Stockpile. Under this act, DLA is required to submit an Annual Materials Plan to Congress that includes a request for disposal of materials that are excess to stockpile needs for each fiscal year, for a total of four years. Each of the alternatives would be affected by this act.

National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.) The National Environmental Policy Act (NEPA) establishes a national policy promoting awareness of the environmental consequences of human activity on the environment and consideration of environmental impacts during the planning and decision-making stages of a project. It requires Federal agencies to prepare a detailed environmental impact statement (EIS) for any major Federal action with potentially significant environmental impact. Federal Agencies are regulated under the Council on Environmental Quality regulations (40 CFR §Part 1500 et seq.) for implementing the procedural requirements of NEPA. Environmental Considerations in DLA Actions in the United States (DLAR 1000.22) establishes policy, assigns responsibilities, provides guidance, and establishes procedures for the integration of environmental considerations into DLA planning and decision-making in accordance with the Council on Environmental Quality NEPA regulations. The provisions of the regulations apply to proposed plans, decisions, and actions of DLA headquarters and field activities that could have an impact on the human environment. This thorium nitrate EA has been prepared in accordance with the Council on Environmental Quality and DLA regulations. It discusses reasonable alternatives and their potential environmental consequences.

Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) The Atomic Energy Act authorizes the U.S. Department of Energy (DOE) to establish standards to protect health or minimize dangers to life or property for activities under DOE's jurisdiction. Through a series of DOE orders, an extensive system of standards and requirements was established to ensure safe operation of DOE facilities.

Protection and Enhancement of Environmental Quality (Executive Order 11514) This order (regulated by 40 CFR §1500 through 1508) requires Federal agencies to continually monitor and control their activities to: (1) protect and enhance the quality of the environment, and (2) develop procedures to ensure the fullest practicable provision of timely public information and understanding of the Federal plans and programs that may have potential environmental impact so that views of interested parties can be obtained. DLA has issued regulations (DLAR 1000.22) for compliance with this Executive Order.

Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (Executive Order 12898) This order requires each Federal agency to identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations.

Protection of Children from Environmental Health Risks and Safety Risks (Executive Order 13045)—This order requires each Federal agency to make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children and to ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.

Trade Security Controls on DoD Excess and Surplus Personal Property (DoDD 2030.8) This directive ensures that all DoD excess and surplus personal property is transferred in accordance with applicable U.S. laws, regulations, and policies. The Director of DLA is required to act as the program manager for policy implementation of trade security control policy and procedures for transfers of DoD excess and surplus personal property.

Environmental Security (DoDD 4715.1) This directive establishes policy for environmental security within DoD. The directive states that it is DoD policy to display environmental security leadership within DoD activities worldwide and support the national defense mission by: (1) ensuring that environmental factors are integrated into DoD decision-making processes that may have an impact on the environment and are given appropriate consideration along with other relevant factors; (2) preventing pollution and minimizing adverse environmental impacts; and (3) protecting, preserving, and restoring and enhancing the quality of the environment.

Environmental Compliance (DoDI 4715.6) This instruction implements policy and prescribes procedures for achieving compliance with applicable Executive Orders and Federal, state, interstate, regional, and local statutory and regulatory environmental requirements. This instruction states that it is DoD policy to: (1) reduce compliance costs and simplify requirements to the extent possible, with pollution prevention being the preferred means for attaining compliance; (2) participate in the development of Federal, state, and local plans and programs for achieving, maintaining, and enhancing environmental quality; (3) use commercially proven solutions, including available technology, to achieve, maintain, and monitor compliance, where possible, and (4) conduct internal and external compliance self-assessments at installations.

Procedural Rules for DOE Nuclear Activities (10 CFR §820). This part sets forth the procedures to govern the conduct of persons involved in DOE nuclear activities and, in particular, to achieve compliance with the DOE Nuclear Safety Requirements by all persons subject to those requirements. Subpart B establishes the procedures for investigating the nature and extent of violations of the DOE Nuclear Safety Requirements, for determining whether a violation has occurred, for imposing an appropriate remedy, and for adjudicating the assessment of a civil penalty. DOE may assess civil penalties against any person subject to the provisions of this part who has entered into an agreement of indemnification under 42 U.S.C. 2210(d) (or any subcontractor or supplier thereto), unless exempted from civil penalties as provided in paragraph (c) of this section, on the basis of a violation of:

1. any DOE Nuclear Safety Requirement set forth in the Code of Federal Regulations; any Compliance Order issued pursuant to subpart C of this part; or
2. any program, plan or other provision required to implement any requirement or order identified in paragraphs (b)(1) or (b)(2) of this section.

Defense National Stockpile Operations Manual (DNSCM 4145.1) This manual applies to the storage and handling of Defense National Stockpile commodities at all storage locations. It includes general storage procedures, as well as policy, procedures, and instructions on packaging, commodity maintenance, health and safety, security, shipping and receiving, and accountability. It also provides general requirements, procedures, instructions, and information required for the acquisition, disposal, upgrading, and quality maintenance of strategic and critical materials in DNSC. Instructions on environmental and occupational health and safety monitoring and reporting are included in the manual.

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